

The Plough, the Loom, and the Anvil.

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ON THE TRUE SOURCES OF PROSPERITY IN AGRICULTURAL AND OTHER INDUSTRIAL PURSUITS.

A DISCOURSE PRONOUNCED BY

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At Newtown, on the 2d October, 1849, on the invitation of the Bucks County Agricultural Society.

How is it, my friends, that you have called upon one who can scarcely make bread for himself to discourse to you,—practical farmers,—of that great art—the mother of all the arts—on which, directly or indirectly, all civilized people depend for their subsistence? Am I, say you, exaggerating the vital bearing of the pursuit, which you have associated to improve, on all the other classes and occupations of life? Is it not from the land that all must derive the tools of every art, and the means and elements of every social comfort? Only imagine for a moment the cultivators of the soil to be stricken from the circle that makes up the great family of mankind; or the plough and the spade, the hoe and the axe, with the very art of using them, to be altogether lost, as have been some of the fine arts of antiquity, and contemplate for a moment the dismal state into which society would at once relapse!

All other arts disappearing with yours, famine and pestilence would pervade the land. Your great and populous cities, the proud and busy seats of all the various employments of social life, would fall into irretrievable decay and ruin. Your halls of legislation—your courts of justice—your school-houses, and the houses of the living God, would be deserted. In the haunts of industry and commerce, the tracks of loathsome vermin would obliterate the foot-prints of useful labour, of eager speculation, and disgusting avarice; and commerce itself, the great instrument of civilization, begotten of agriculture and manufactures, would perish, in want of the materials which they alone can supply; and finally, over the cultivated fields which now yield their golden harvests to the scythe, dense forests would resume their dominion, filled with beasts of prey in rivalry with savages, leading, like themselves, a precarious and miserable existence—dying of hunger, or gorged with blood!

Such, my friends, are the consequences that would infallibly ensue the annihilation of your industry, and of yours only; for while all others depend on it, all others are comparatively superfluous. With the loss of your implements and the art of using them, civilization itself would languish and expire, as if all nature were struck with one universal paralysis. In contemplation of such consequences, you will allow that I have not exaggerated the essential bearing of agriculture on all other classes and pursuits; and will, I trust, therefore, excuse me from descanting on the somewhat hackneyed theme of its antiquity, its dignity, and its importance!

Dispensing then with all further preface, and coming at once to our subject, let me ask you, my friends, after so much of anxious effort, after all that

has been written—after fairs for forty years, to exhibit the greatest quantity and excellence yet attained in the production of crops, and the form of animals, and the structure of implements and machinery, *what has been the actual progress, and what is the general state and condition of agriculture in Pennsylvania?* For, believe me, we must not be dazzled and satisfied with holiday shows of pampered stock, imported or bred by the opulent or the amateur farmer—meritorious and useful as it is to import or to breed such—neither should we be deceived into self-complacency and dreams of progressive and general melioration, by accounts of heavy crops on patches of land made by farmers, young or old, to win cups of silver or paper diplomas, scattered by some high-sounding institutes, at this season, like autumnal leaves over the land. For that matter, we may go back more than a quarter of a century for some of the largest products on record of all our most important staples. All these things, however, do well to keep up a wholesome excitement—a sort of moral ventilation in the agricultural world; and farmers deserve, while they benefit by, this sort of diversion, if it serve not to delude and draw them off from the true question, which lies at the bottom of every inquiry into their rights and condition as a class.

We ought, in fact, to have in every election district a farmers' club, holding their monthly conversational meetings, as auxiliaries to county societies, and in every county a branch of a great State society; and in all our country schools, the course of education should have direct reference to the great industrial pursuits of the American citizen; and all this will come about as the natural fruit of the policy I am inculcating in "*The Plough, the Loom, and the Anvil*;" but, mark me, *never without it!*

These annual gatherings and exhibitions of the followers of the plough encourage sociability, and lead to the interchange and diffusion of intelligence and neighbourly feeling, while they serve, also, in their way, to dissipate ignorance and its inseparable companions, prejudice and intolerance. But, let me admonish you that, after all, the great question which still recurs to every man who gives his heart as well as his head to the subject is—what are the signs and what the securities for well-assured, deep-rooted, wide-branching improvement in the art, as indicated by *reasonable and steady remuneration to labour and profits to capital employed in agriculture?* And that is the problem, and that alone, which I came here, with the humblest appreciation of my own capacity, to discuss! For, in sober earnestness, what can I tell you that you do not know, in mere matters of practice?—as for instance, about the manner and the importance of draining your land of all superfluous moisture; which you all know makes, as does the cornerstone of the building, the very first step in every well-devised system of improvement. Would it not be a matter of presumption in me, in the wake of such men as Darlington, to dwell on the value of lime, to be followed and supported by that best of all, because combining all fertilizers, barn-yard manure? Need I descant on dairy husbandry to Pennsylvanians, the makers of the best butter in the world—or at least in the United States? Shall I describe to you the various breeds and best forms of domestic animals, and how the best degenerate with us for want of that steady and remunerating demand for the best, which elsewhere and everywhere leads to the highest skill and excellence in every department of human industry? Were I to venture on any mere practical suggestion, it would be to intimate, that, of late years, the public mind has perhaps been drawn off too much from the importance of straining every nerve to accumulate, and turn every putrescible substance into manure, to go abroad in search of artificial stimulants—that the mind of farmers has been too much dazzled by accounts of exorbitant crops, on small spots, without reference to cost; and their attention

too much captivated by the sight of sleek and pampered stallions and fat bullocks; while they have comparatively neglected the more important but less striking objects of *the most perfect tillage*, and the highest degree of attainable economy in the *structure of farming implements*. For a highly important, perspicuous, and demonstrative essay on the great operations of preparing your land for the reception of seed, and on the deposition of the seed when it is so thoroughly prepared; I feel it to be my duty, in our present relations to each other, to refer you to the last number of "The Plough, the Loom, and the Anvil," which I have here the pleasure to present to your society, and where you will find the whole subject philosophically and practically discussed, and illustrated by diagrams, that place the matter in a light so clear that, as I have there said, "he who runs may read."

To these few practical hints, might be added the strong persuasion, that Pennsylvania farmers have sacrificed millions, to their proverbial partiality for the large, short-lived, heavy feeding Conestoga horse, for farming purposes, too exclusively—even where he might, with obvious economy, be substituted by the longer lived mule, and the more patient and *edible* ox. But our time is too precious to detain you here, with a question so often and so elaborately discussed in our agricultural periodicals. For views of it, also, in all its aspects, I may refer you to the journal already named, and will only add, that in a national point of view, it is well worthy of inquiry, how much every superfluous horse diminishes the production of *meat*, and in that way lessens the return to the land of the refuse of its products; thus doubly abridging the means of human subsistence. As an item of individual economy, in agricultural management, I can tell you from personal inquiry and observation, that were you to compel the New England farmer, whose opinion it will be admitted is worth something in all such cases, to use horses in place of oxen, for hauling or ploughing on his farm, he would, on a view of that item alone, say—*Then take my land*, and let me go to where people have the sagacity to see that when you can no longer employ an animal for your benefit, it is better to put it in the harness-tub than to give it to the buzzards. Hence it is, that among our friends "down East,"—and especially in the best cultivated portions of it—you never, or very rarely, see a premium offered for a horse. A farmer will keep one to carry his family to meeting, over those excellent roads always to be found where the loom and the anvil are near to the plough, and in the week when hauling, to hitch on ahead of his oxen.

It is the great boast of Pennsylvania, comprising about as many acres as the six New England States together, that she supports a population less than they, by about 500,000, but then, *she feeds 100,000 more horses than all these six States united!* Supposing her to supersede 50,000 of them with oxen, and yet retain 50,000 horses more than are to be found in all New England, I leave you to calculate how much beef could be reared and fattened, for feeding men, on the 300,000 acres now dedicated to the feeding of these 50,000 horses thus substituted by oxen, supposing these horses to consume the produce annually of six acres of oats at $33\frac{1}{3}$ bushels to the acre!

And here, again, this question of the extent to which the use of horses supersedes the production of butchers' meat, (a problem well worthy of careful analysis,) prompts me to suggest, that it would be well for your Society, and all industrial associations throughout the Union, to urge upon their State Legislatures respectively, the establishment, at every seat of government, of a *Bureau of Statistics*, as has been lately and very wisely done in Louisiana, and very wisely placed under the superintendence of Mr. De Bow, the able editor of "The Commercial Review." Such a bureau in every State, would at once supply the lawgiver with data to enable him to

develope and protect, with better knowledge of his subject, the various interests committed to his charge. How, in fact, can any government be wisely *administered*, in ignorance of the very elements with which it has to deal—its mineral, agricultural, and manufacturing capabilities—the extent of its waste and its cultivated lands, and the wealth that might be realized from its forests, its fisheries, &c.?

For State purposes, the decennial returns collected by the general government (with a want of fulness and accuracy that smacks strongly of carelessness, to say the least for the objects contemplated) are altogether inadequate—nor can they, perhaps, be made with accuracy, without more efficient co-operation of State authorities, which might well be made accessary for these as for other political purposes: and moreover, may not the State sovereignties be well ashamed, if not afraid, to acknowledge a servile dependence on the central government to do for them what their local interests require, and their local institutions enable them to do better for themselves? Let, then, all agricultural societies unite in demanding from the general government the establishment in each State, of a *normal school* for the preparation of teachers in agriculture and the practical arts and sciences connected with useful civil pursuits, on the general plan of the military schools now supported chiefly by the landed interest; and let them demand, as I have already said, of the State governments, the institution of *bureaus of statistics*, which might also take charge of the statistics of all their public works, in which the State is interested as stockholder or sponsor.

Much better would Congress be employed in erecting a monument to Washington, in the establishment of a bureau as recommended by him, to enlighten the government in respect of its agricultural resources and interests, than in rearing perishable piles of stone and mortar, vain memorials, when built in honour of one whose fame already extends to the utmost verge of civilization, and will endure as long as the love of liberty shall remain unextinguished in the hearts of men.

The feeling that prompts such memorials cannot be too much respected, as emanations of pure and grateful patriotism; and long may they serve to adorn the cities in which they point their spires to the skies; but as a means to extend and perpetuate the name of WASHINGTON!—as well might we attempt to swell the tides of the ocean, by flinging on its bosom the crystal drops that sparkle in the morning sun on the bosom of the rose! Such expedients, originating in barbarous ages, before the invention of letters, and often prostituted to the purposes of tyranny and fanaticism, suggesting the memorable lines—

Where London's column, pointing to the skies,
Like a tall bully, lifts its head and lies—

might yet do well enough to eke out the celebrity of a lucky politician or a merciless hero stained with blood; but for such men as WASHINGTON and FRANKLIN—men sent of Providence to snatch the sceptre from tyrants and the lightning from the clouds, their memories need but the use of types and a free press, and for the rest—History may be left to do her office.

But let us return, my friends, in search of that worm—that mining moth—which in the old States is gnawing at the vitals of the tree of agriculture, giving it, not the venerable and yet hearty look of a green old age; but presenting it to the view of the anxious observer, “sicklied o’er” with that sad aspect of premature decay which you have seen some valued friend take on in the prime of manhood, when struck inwardly with some deadly disorder.

Resuming, then, the inquiry as to the actual condition and prospects of Pennsylvania agriculture, after so many efforts to assure for it gene-

ral and progressive improvement, and going back to the formation of the Agricultural Society of Philadelphia, including all their volumes of essays by such public-spirited patriots and farmers as Worth, and West, and Buckley, and Ingham, and McAlister, and Morrison, and Moore, including the practical writings of Lorain, and more recently the zealous and intelligent labours of Tatem, the valuable edition and addition of Doctor Emerson to the Farmers' Encyclopedia, notwithstanding all the costly, well-selected, and valuable importations of animals by Col. Powell and others, let me again warn you, that it is not a sleek imported bull, nor a pampered stallion, nor a square-built Dishley ram, nor a no-bone pig, that will, any one of them, or all united, answer this important problem—by far the most important, if not the only question worthy of the consideration of the statesman or the farmer, as I have already said, is, as to the real foundation, the *law* of agricultural economy. Let us not be drawn off in admiration of this rich man's farm, or of that man's pet stock, as evidence of increasing knowledge and prosperity; but let us look around and abroad over the whole commonwealth, and let the inquiry be in regard to the community as a whole, not so much whether men *produce* more, but do they find a *better market* for what they do produce?—for supply is sure to follow adequate demand. Do men live in better houses themselves, and their cattle? Is labour more diversified, and are all classes able to consume more of what each class produces? Are orchards throughout the State more extensive, more numerous, and better cared for? Your enclosures more substantial and perfect? Are your swamp lands cleared up, and boggy lands more thoroughly drained? Are the farmers over the State making more of potatoes, and carrots, and cabbages, and things that, being sold close to the plough and the harrow, sell by the ton; in lieu of exhausting crops that, being sent to a distance, must be sold by the pound and the bushel? In a word, are your young people coming earlier together in holy wedlock, and your population increasing and contented; and school-houses and churches becoming more and more numerous, for these are the infallible tests of a prosperous community? Alas! here and there it is that improvement may be seen; but, on the other hand, here and there, and almost everywhere in the old States, deterioration is obvious.

We are told, on the authority of a candid and intelligent inquirer before the Revolution, that wheat, in many parts of the province of New York, yielded a larger produce than was common in England. Upon good lands about Albany they reaped from 20 to 40 bushels to the acre. "The latter quantity," said he, "is not often had, but from 20 to 30 bushels are common," and this with such bad husbandry as would not yield the like in England. Does Albany county now average 10 bushels of wheat to the acre? In what other department of industry has there been such deterioration? And why is it so in agriculture?

As to Pennsylvania, the same American writer remarks, "In the productions commonly cultivated, wheat is the grand article of the province. They sow immense quantities about the latter end of September, rising from two to three bushels of seed to the acre, which on good lands yield from 25 to 32 bushels per acre; on fields of inferior quality, or such as are almost exhausted by yielding corn, they get from 15 to 25 bushels."

Is it not well worthy of remark, as connected with the subject of this discourse, that the rate of decennial increase of population in both these great States, with all their magnificent natural resources, has been constantly falling off for the last fifty years; and though the decline in that respect has been not so marked in Pennsylvania as in New York, and neither of them comparable with what has occurred in Virginia and South Carolina, free-trade States, yet here, in Pennsylvania, it is the more remarkable, in

consideration of her magnificent agricultural and mineral capabilities, with her expanded lake-coast and noble rivers draining thirty millions of acres of naturally superb land; and then so remarkable for the water-powers these rivers present, as if pointed at by the finger of God himself, for the domestic manufacture and consumption of every thing that her farmers can supply or require! Now the average product of wheat in New York is under 15 bushels; that of Indian corn not exceeding 25 bushels; and of potatoes less than 100. The obviously careful and impartial author already referred to gives the following account of the produce of 16 acres of land on the Hudson, "the soil a light, thin loam, of reddish colour, on a lime-stone rock, which had been rejected by several new settlers."

The first year, according to his statement, it produced of potatoes 687 bushels to the acre; second year wheat, 32 bushels; third year potatoes, 531 bushels; fourth year wheat, 37 bushels; fifth year barley, 45 bushels; sixth year peas, 39 bushels; and seventh year clover was sown, and left an excellent pasture, which was reckoned as profitable as any other piece of land on the whole plantation.

These were crops from virgin soil, but without manure. How does the average of that State or this, compare now with the produce then, notwithstanding all the societies formed, and books written, and, in New York, money distributed and Institutes endowed with large annual donations in cash, and their transactions printed and distributed at the expense of the State? In 1845, the average produce of the State of New York, of the same articles, has been put down at wheat 14 bushels per acre, rye $9\frac{1}{2}$, potatoes 90, peas 15. Now look at all the other arts and industries, except that of cultivation. Have they not all improved and advanced, notwithstanding our policy always fluctuating, but, as General Jackson said, always "too much subject to the policy of the British merchants." Why should we not have improved in the practice and productiveness of agriculture as we have in ship-building and house-building, and in all the manufactures, and all the arts, in the prosecution of which men come together and combine their forces, their capital, and their talents, instead of dispersing and flying from each other, as has ever been and still is the case in agriculture? Does it not show that there is something rotten in the state of Denmark; some blighting influence, some defect in the *law* of the case, which retards the development of resources more various and abundant than ever was showered by the bounty of Providence on any other people? Has the fault been with yourselves or your teachers? Alas, my friends, with sorrow, somewhat akin to shame, I admit that (I speak alone for myself) the fault *has been with your teachers!* We began *at the wrong end!* We may be likened to the farmer who, seeing the fruit of high promise dropping prematurely from the tree, would attempt to cure the evil, and restore it to life and vigour by washing the body, and pruning the branches; forgetting that a canker-worm is gnawing at the root, which must first be discovered, cut out, and destroyed, and that being done, health, and vigour, and fruitfulness will ensue. Our great mistake has been in endeavouring to find out and teach you only how to become *producers*; without giving a thought to the great problem;—how we should raise up close around you *prosperous consumers, to take what you are sure to produce, if sure of adequate reward!* Had we bestowed the same time and the same labour in endeavouring to teach you to bring consumers to your side, thus furnishing a market on or near the land for the products of the land, the result would have been widely different.

Agriculture, my friends, has never made progress in the absence of a consuming population, nor has it ever failed to improve when the consumer was brought, as recommended by Mr. Jefferson, to take his place by the

side of the producer. The sandy wastes of Belgium have been converted into the richest fields of Europe, by a policy directly the reverse of that which has exhausted the rich soils of New York, and Maryland, and Virginia, and Carolina, and is now exhausting Kentucky, Tennessee, and Ohio. In Belgium the consumer and the producer are side by side, or close at hand, and the farmer saves all the cost of transportation, and thus is he enabled to return to the land all the refuse of its products, and the land increases in its power from year to year, with steady increase in the value both of land and labour. That country grows in population more rapidly than any in Europe; it has 350 inhabitants to the square mile, while Pennsylvania, from which people are flying off, has only 37, and yet we rarely meet with a Belgian emigrant, because the whole policy of its government tends to enable its people readily to exchange their products with each other, and does not, as is the case with ours, compel them to look to distant markets, wasting in the work of transportation far more labour than was employed in the work of production, exhausting the land, and compelling the owner to fly to other lands to be again exhausted!

Look around, my friends, through the world, and see where agriculture makes most progress, and you will find it to be in those countries in which population most abounds, and in which there exists that diversity of employment which brings the plough, the loom, and the anvil into the closest proximity—New England, Old England, and Belgium. Look again and see where it is that agriculture goes backward, and you will see that it is in lands of diminishing population and wealth, and of little diversity in the pursuits of the people—those in which the population is most exclusively agricultural, the plough, the loom, and the anvil being widely separated by notions of free trade, and forbidden, by “too much subserviency,” as General Jackson said, “to the policy of British merchants,” to take their places by the side of each other—as in Virginia, South Carolina, Mexico, Spain, Portugal, Sicily, Egypt, India. India abounds in rich lands that she cannot cultivate. So do Mexico, Sicily, Egypt, and all the rest, because the labour of clearing and draining the rich lands is greater than can be borne when the cultivators are compelled to depend on distant markets, as they must in that case raise wheat, or cotton, or some other article that will bear keeping, and of which the earth yields pounds or bushels instead of tons, and will therefore better bear distant transportation. Hence a friend at Montgomery, Alabama, told me that he had in vain offered \$20 an acre to get two hundred acres roughly cleared for the plough! Give to the owners of such lands a consuming population, near at hand, to diminish the cost of transportation, and they may raise turnips and carrots, of which the earth yields by hundreds of bushels, and then they and their lands will grow rich together.

I pray you to bear in mind that “the *first thing* that is to be paid by land is transportation. If that be so great that it will not leave enough to pay the wages of cultivation, the land will remain uncultivated.

“The *second thing* that is to be paid is wages. If transportation and wages eat up the whole product, the land may be cultivated, but it will pay no rent; and as the *price* of land is determined by the amount of *its rent*, or surplus product, it can then have no market value.

“The *third thing* that is paid by land is rent; and that is the surplus that remains, after the payment of transportation and labour.

“It will be obvious to all of you, that the man who cultivates land must derive from it food, and clothing, and shelter for himself and his family—that is, he must have wages for his time—and if he cannot have that, he will remove to some other place where he can have them. *That is, then, a constant quantity.* The variable quantities are transportation and rent,

and *the former is always the first to be paid*. Whatever is deducted from the expense of transportation is added to the rent, and whatever is added to the expense of transportation is deducted from the rent, and it is because railroads usually diminish the cost of transportation that land rises in value." Railroads help to build factories, and factories help to build railroads, and all such establishments conspire to insure profits to the cultivators of the soil.

The railroad enables the farmer to save a part of the cost of transportation, of which cost time makes a part, and his lands accordingly improve in value. Next the furnace, the coal-mine, the rolling-mill, and the cloth factory bring the market near his door, and now his lands double in value, because he saves all the cost of transportation, and all the manure, and the land and its owner become rich together. This, however, is but a small portion of the gain of the farmer, in consequence of the diversification of pursuits, resulting from bringing the loom and the anvil, the furnace and the factory, to take their places near to the plough and the harrow. The coal-miner makes a market for prop-timber to be used in the mines, and for rails and sleepers to be used for the making of roads, and for lumber to be used in the construction of houses, and the farmer is thus enabled to clear his land with large profit, whereas, without such demand, his best lands might and would have remained encumbered with timber, because, as in the case of my friend in Alabama, the cost of clearing it would be more than it was worth when cleared. The spare labour of his sons and himself, and of his horses, that must be fed whether employed or not, is employed in hauling the timber to market. His straw, hitherto almost valueless, sells for almost as much as before he could get for his grain. His daughters find demand for their services; and thus the presence of a consuming population enables him to obtain his cloth, and his iron, and his fuel, in payment, more or less directly, for timber and labour that before were wasted, and nearly the whole is pr. fit, while his land goes up doubling, trebling, and quadrupling in value.

Look around, I pray you, my friends, and calculate how much labour is wasted in your immediate neighbourhood for want of that regular demand which is produced, winter and summer, by the proper diversification of labour. Look again, and see how great is the difficulty of obtaining assistance in harvest, because of your inability to provide demand for labour at other seasons. Had you a great consuming population near you, engaged in making cloth or iron, or in mining coal, you could at all times command the necessary aid, but now it is a day's work to find a good labourer to assist you in securing your grain, and much is liable to be lost for want of that aid. So it is at the South, and for the same reason. Pertinaciously determined to be agriculturists alone, and to keep the loom and the anvil at a distance from the plough and the harrow, the planters lose millions of dollars for want of aid in gathering their cotton or their sugar-cane. An extensive sugar planter lately told me, that it was always matter of rejoicing when the worm diminished the demand for labour in the cotton-field, because it enabled the cultivator of sugar readily to secure his crop.

If you desire evidence of the effects resulting from bringing the consumer to take his place by the side of the producer, pay a visit to Schuylkill county; but go not now: it is almost in a state of desolation: two years since it was filled with prosperous producers of coal and consumers of food, the produce of the plough. The tariff of 1846 is closing the factories and furnaces and rolling-mills of the Union, and the demand for coal has so far diminished, that numerous mines are closed, and the demand for labour is so reduced, that miners and labourers are now becoming potato-growers—changing from the relation of consumers to take the place of rivals to the

farmer—for bread is the first necessity, and must be dug directly from the earth, when men are denied the power of making other things to give in exchange for bread. Schuylkill county possesses the labour-power and the machine-power requisite for sending to market 65,000 tons of coal, worth a quarter of a million of dollars per week, or thirteen millions of dollars per annum, all of which would be given in exchange for food, or for clothes, which represent food or wool—the products of agriculture—or in exchange for iron, which again represents food and clothing—or for the use of horses, or railroads and canals, which also represent food and clothing; and thus the whole of these thirteen millions would go ultimately into the pockets of the farmer and the planter; and hence it is that I am inculcating, with all my mind and with all my heart, the propriety of drawing the loom and the anvil, close to the side of the plough and the harrow, as the indispensable beginning, and sure foundation, *for all certain and reliable improvement in agriculture*. Schuylkill county will this year send little more than five millions' worth, and yet the cost to the community is precisely the same as if the whole thirteen millions' worth of coal had been produced. The labour is there, and must be maintained. The steam-engines are there, and must be kept in order. The houses are there, and must be kept in order. The railroads and the canal are there—the labourers are there, and must be supported. Every thing is there except the demand for labour, and for want of that the valley of the Schuylkill suffers a loss in coal alone to the extent of eight millions of dollars in this single year, almost every dollar of which would be expended for food and clothing—the products of the land. That, however, is but one part of the loss. The valley is becoming studded with idle furnaces, and idle furnace-men and idle labourers, who should be getting out ore, and assisting to convert ore and coal into iron, and here we have a further loss of millions of dollars' worth of labour, all of which falls at last upon the planters and farmers of the Union, for all would be absorbed in the purchase of that which the land produces; and thus, my friends, do you not see how the men who follow the plough and who wield the scythe are benefited by, nay how indispensable to them, is the prosperity of diversified and prosperous pursuits in their immediate vicinity? It is probable that few of you may have leisure to go so far to see these things; nor is it necessary, for they, alas! are to be seen in every part of the Union. Of the numerous furnaces at Danville, but one, I believe, is now in blast. Of all the rolling-mills in the Union, for railroad iron, not one, I believe, is now at work. One of them is close at hand across the Delaware, and if you desire to understand the working of the free-trade system, I would recommend you to pay a visit to the fine establishment of Mr. Peter Cooper, at Trenton, that so recently gave employment to hundreds of working men. On arriving at his factory, you will find it closed, and if you ask for his lately prosperous labourers—consumers of food—you will find them unemployed, and unable to make wages by aid of which to purchase food and clothes: for, as I have told you, as all other pursuits depend for employment directly or indirectly on the land and what it supplies, chiefly by cultivation, so do the wages of labour, in all other pursuits, go ultimately back to pay for the products of the land. When next you go to Trenton, you will find that most of these discharged labourers have sought the West, there to become the producers of food, and that from being your customers they have become converted into your rivals; and here, my friends, you will find the cause of the slow progress, if not the stationary or retrograde condition of agriculture and value of land, notwithstanding all the associations that have been formed, and all the volumes that have been written, and

all the silver cups and spoons, and "Transactions" and paper "diplomas," that have been distributed for their advancement, for the last fifty years.

It is not so much, let me repeat, that you need information to teach you how to *produce*—what you need is a *steady and remunerating market!* Only bring that stimulus to bear steadily, and all the rest will follow as certainly as effect will follow cause, throughout all nature. Nature, it was said by philosophers, "abhors a vacuum," and if the policy of the country were such as to open demand, the vacuum thus created would be sure to be filled. Common sense—the very instinct of self-interest—will be sure to do the work. Hence it is that the cultivators of the soil are peculiarly, and above all classes, benefited by protection to American industry in all its forms. It is *the want of that* which banishes, year after year, tens, and even hundreds of thousands to the far West, there to become producers of food—your competitors, instead of being active and prosperous customers to the farmers of Pennsylvania, and other of the old States: the consequence is, that there is a perpetual redundancy of all that you can make, seeking a market in Europe; and on its way to that market, it fills Philadelphia, Baltimore, New York, and Boston, and thus breaks down those who, like ourselves, would have preferred to remain at home, and thus it is that swarm after swarm is driven off into the wake of those who went before, to perform for you the same operation. Your market is stocked with a superabundant supply of every thing—you are left without motive to devise the means of augmenting your crops by increased diligence and ingenuity, and still you ask, why is there no general all-pervading improvement in the art and practice of agriculture, as in other arts? And will you continue for the next, as you have done for the last fifty years, to expect steady and progressive melioration by the occasional and fitful efforts of agricultural societies and exhibitions? by the production of heavy crops from single acres, and by laying masses of fat on single bullocks?

As I said before, the disease is not on the surface nor in the branches, it lies at the root of the tree, and there, to be effectual, your remedy must be applied.

It is this absence of avowed, direct, positive protection to domestic industry in all its branches, that provides a constant supply of emigrants from among our native population, nine-tenths of whom would never have sought the West from choice. In addition, we shall this year add 300,000 to our population by the immigration of foreigners, and every man of them will, by the next year, go to raising food for himself, and a surplus to send to market; for the demand for labour in the mines and furnaces and mills and factories is now far less than it was three years since, notwithstanding a vast increase of population in the meantime. The consequence is, that the new States are filling up with unnatural rapidity, and the result must prove disastrous to the farmers of the old States. The desertion and abandonment of the old States is premature and unnatural—superinduced by an unnatural and suicidal policy. In the order of nature the bees wait until the hive is crowded—until, in fact, the heat of it, in consequence of its thickened population, becomes intolerable, and then only does the hive send off its surplus inmates to seek subsistence in the nearest field that will afford employment and support. Our policy is such as to force the bees, by a cruel disturbance, to swarm prematurely, and so our people are driven away from fields which they have no motive to improve, and from rich lands that they have no inducement to drain; and water-power, and beds and mines of coal and iron, all unused, to raise corn and meat in the virgin lands of the West, which, when raised, they cannot consume, and can only sell by swelling the surplus of the old States, and then for not more than will pay the expenses of cultivation and transportation; leaving for themselves not as much as, under a wise and protective policy of govern-

ment, they might have made in other employments ; and thus it is, the lands of the old States are exhausted and their owners left without material, means, or motive to improve them. Thus it is, that notwithstanding so much writing, and so many cattle shows, and so much fitful, ill-considered, and impulsive effort at recuperation, there is yet no general progressive average increase and improvement of agriculture over any large district of country where there is no diversification of labour. We are always brushing cobwebs from the branches, when we should be working, let me once more repeat, to keep all safe, and sound, and vigorous at the root of the tree.

Look around, I beg you, and see for yourselves ? You can see that the mines, and mills, and furnaces are closed. Do you see that any new ones are needed ? You can see that the men who, three years since, worked in the mines and furnaces, and built more mills and furnaces, eating the potatoes and the corn of the farmer, and wearing the wool of the farmer and the cotton of the planter, and consuming of all freely because of his ample ability to pay for them ; these men are now unemployed, and as their employment at the loom and anvil ceases, so ceases their ability to buy and consume the products of the plough, and nothing is left then but to take themselves the handles of the plough, to keep soul and body together. "Seeing is believing," and seeing and believing that such is the course and condition of things, do you wonder that I, animated all my life by passionate regard for the landed interest, should endeavour to bring into close and prosperous neighbourhood to each other, the plough, the loom, and the anvil ?

My friends, every man knows—for every man can see for himself—that there is going on a wonderful increase of our population, and that every day, under the working of the present system, increases the ratio of producers to consumers, and that the consequence of a continuation of this state of things must be a vast increase in the numbers of *sellers* of food, with a corresponding decrease in the number of buyers of food, attended with a great reduction in the price of the commodities to be sold. With any such reduction, *agriculture must go backward*. The case is as plain as that 2 and 2 make 4. The farmer cannot make improvements when he has to give much food, much of the products of the plough in exchange for what he must use and consume in his family.

Look back to the tariff of 1842, and you will see what were the consequences of a course of action such as I have described. We are now again closing our factories and furnaces, and buying largely of foreign food, in the form of cloth and iron, and paying for it in evidences of debt. So did we in 1837, '38, '39, and '40. That course brought upon us the foul stain of repudiation. Like causes will always lead to like effects. If you desire, my friends, to understand how the present tariff is working with reference to the interests of your State, look to the fact that the wrought iron descending the Susquehanna canal has fallen from above eleven millions of pounds last year, to less than three millions this year, and the pig iron (all representing the products of the land) has fallen from fifty-one millions to twenty-seven millions. And then look to the great fact that the State itself is purchasing foreign iron for the road now making for the avoidance of the Inclined Plane. The people of Columbia, and Huntingdon, and Centre, and Schuylkill, and Montgomery, who should be getting out ore, are idle, and the people who should be making charcoal or getting out coal are idle, and the horses and wagons are idle, and the idle people are unable to buy food from the farmer, or cloth from the manufacturer, and those who can afford to go are going west to raise food, that they may enter into competition with yourselves ; and you, the farmers of Pennsylvania, are buying foreign food, in the form of iron, to make your own roads. You

drive your customers west to become rivals, or you drive them into poor-houses there to be supported at your expense, and you tax yourselves to raise money for the purchase of iron made with food raised in Poland or in Russia, by serfs who are bought and sold by the hundred head, like so many cattle and sheep, with the land on which they labour, for as much black rye bread, called *pumpernickle*, as will keep soul and body together! Is not this suicide? Is it wonderful that farmers are poor, and that lands are poor? Is it wonderful that your farms are as large and as unproductive as they were thirty years since? Let the policy, then, which withdraws from American labour protection from competition with the serfs of Russia, be called the *pumpernickle policy*!

Land, at the distance of a few miles from New York, in West Chester county, is selling at several hundred dollars an acre, because the railroad has diminished the expenditure between the consumer and the producer, and yet that land is not now worth as much as would be that of Bucks county, if you had, as you should have, consumers among yourselves. Look what railroads have done in England, and remember that the road only enables the farmer to go to market, while the mill brings the market to his doors.

An English writer says that between Croydon and London his attention was continually attracted by the high order and beautiful appearance of the market gardens through which the railway runs. This land seven years ago was occupied as grass land, for ordinary purposes. Its gross produce was under \$40 an acre, and the rents paid not more than \$12 or \$15. Now that it has been converted into market gardens, well grubbed and well drained, it yields \$300 an acre and rents for \$35 to \$40. Gardening precedes farming, and is the best school for teaching lessons in practical agriculture. It is there that men are forced to see the necessity for thorough draining, thorough tillage, heavy manuring and thorough weeding, and clean, good seed, and that embraces nearly all that is to be learned.

The same writer relates the following anecdote:—"An agriculturist and large land-owner in passing through these grounds expressed aloud, in the railway carriage, his admiration of the fine order and beautiful appearance of the crops, and his surprise at the entire absence of weeds. An opposite passenger, who had entered at Newcross, broke in upon him by saying—"Weeds, sir, of course, you cannot see any, there are none; I pay £8 (\$40) an acre a year for some of that ground, and it costs me as much more for manure, and do you *think I could afford this and grow weeds?*"

Why is it, my friends, that you can afford to grow so many weeds? Simply because you have made no market on the land for the products of the land.

Farmers of Old Bucks, it is high time that you should look into these things for yourselves, and permit yourselves no longer to be ridden by political demagogues, "booted and spurred," whose sole object is that of living at your expense, altogether careless of the effects that may result to your interests from the measures they advocate. For myself, I have no political aspirations. The residue of my life will be, as the prime of it has been, devoted to the welfare of the tillers of the soil; and I tell you, and challenge contradiction, that the plough and the harrow never have flourished at a distance from the loom and the anvil, and they never can: for the land must become unproductive when the profits of production are swallowed up in the costs of transporting and converting the products the farmer has to sell, into the commodities he has to buy, and thus fails to return to the land the refuse of its products.

Let partisans squabble as they may for power and for place, and with that end let them dispute for ever about State banks and banks of the United States, and sub-treasuries and Wilmot provisoos; but the protection

or abandonment of *the domestic industry of the people* in the various branches for which a bountiful Providence has supplied the materials, and in its conflict with the pauper labour of Europe, is a great national question—too high, too sacred to be dragged and begrimed in the foul mire of party. Let all good men unite to withdraw it from that arena in which passionate advocates appeal to blind tribunals, and prejudice holds the scales of justice. Yes, my friends, this is a great question which men may consider and decide according to their best judgments, without any forfeiture of mere party allegiance, about which the most honourable and well-meaning men are so tenacious; for who dare say, that principles advocated by Jefferson, by Madison, by Monroe, by Adams, by Jackson, are not republican principles—not democratic republican principles? Mr. Jefferson, high on the list of democrats, said, we “must now bring the manufacturer to take his place by the side of the agriculturist.” Jackson, whose orthodox democracy no one will dispute, said—In place of feeding the paupers of Europe by sending abroad for manufactures made by their labour, we must feed our own. And here I may go further and quote from one of General Jackson’s favourite cabinet counsellors. Our neighbour Governor Mahlon Dickerson, a member of the great sanhedrim of democracy, as late as the autumn of 1847, in his opening address at the American Institute at New York, went “the whole hog” in favour of direct, unequivocal protection, pronouncing a tariff for revenue to be a “modern discovery;” or rather, said he, emphatically, a “modern invention!” and but for the schemes and machinations of partisans, so it would be universally considered and treated. Thus I have shown to every man who desires to examine the question—not as a politician, but as a statesman; not as a partisan, but as an American citizen—that he is at full liberty to follow the truth wherever it may lead, without giving any man the right even to question his party fealty.

As Jefferson and Jackson thought, so thought all our Presidents, until we reached him of Kinderhook. He thought it better to feed the paupers of Europe, and let our own take care of themselves, if they could, and if not, they might starve.

It may not be amiss, my friends, for you to compare the names of those who have believed with Thomas Jefferson, and all the patriots of the Revolution;—with those who have advocated the policy which has given us the tariff of 1846, and judge between them:—

Protective Presidents.

Washington,
Adams,
Jefferson,
Madison,
Monroe,
J. Q. Adams,
Jackson,
Harrison,
Taylor.

Free Trade Presidents.

Van Buren,
Polk.

Common sense taught the people of the colonies that they needed protection against the evils of the colonial system, as it is now teaching the people of Canada that they never can prosper under the existing free-trade system. They now desire protection, for that is the leading object with every Canadian, as you may see in the address of the British league. They see that land on the south side of an imaginary line is worth three times as much as that on the north side of it, and they see that the cause is to be found in the fact that the farmers of the United States have a home-

market, which they have not. They have free trade, and they are ruined. They desire annexation, that they may enjoy even such protection as we have, and thus we see that they are animated to action by the very same reason that governed Washington, Franklin, Jefferson, Adams, and all the great men of our own Revolutionary period.

And now, farmers of Pennsylvania, I want to remark to you, in conclusion, that wherever certain causes are seen invariably, or with much uniformity, to be followed by the same results, this visible consequence of effect upon cause, is termed "*the law*" of that case. Thus of the laws of nature as applied to inanimate objects, we speak of the law of *gravitation*, the law of *motion*; and then again of the law which regulates the processes of animal and vegetable economy: so in the case of agricultural economy, to which I have been referring, there is undoubtedly a natural *law* that regulates and governs it, and which, as you value not only your pecuniary welfare, but as you should pride yourselves on understanding the true sources of prosperity for the community to which you belong, it behooves you to find out and understand—for, if legislative action be in accordance therewith, agriculture will surely and steadily advance, and step by step with its advancement will be the march of every art, and of all the blessings that wait on civilization. Study that law, and you will find it in perfect accordance with the simple yet great truth which teaches that "in union there is strength." Study, then, the present course of our legislative action, and you will find that we are obtaining disunion and separation among ourselves, while seeking freedom of trade and union with foreign nations—that Will-o'-the-wisp which has so long amused and misled Maryland, Virginia, and the Carolinas, persuading them to pride themselves upon their exclusive addiction to a *single pursuit*, and sending away to distant looms their wool and their cotton, leaving their rich mines of coal and of ore undisturbed in the bosom of the earth, and their mountain streams to go on leaping from fall to fall, their echoes resounding in the wilderness, while they are wending their way, unemployed, to the ocean, as has been the case from the beginning of creation. You will then, I think, arrive at the conclusion that without a change of policy agricultural deterioration must continue.

He calls in vain on Hercules for help, who will not help himself. You may go on holding cattle shows, and giving premiums to have proved again what has been proved a thousand times. You may have cows to yield milk by the gallon, and sows to farrow pigs by the dozen, but as "every swallow does not make a summer," neither will these extraordinary productions, in isolated cases, insure general progress and improvement in the art or the practice of agriculture.

If you would better understand the law of which I have spoken, let me advise you to read an American work, which, now that it is praised in Europe, Americans will begin to study, as farmers are now, over the whole country—crying for *guano! guano!*—a substance of which I distributed some barrels in Maryland, twenty-five years ago, with every thing from Humboldt, and Ulloa, and Vauquelin, necessary to be known about its properties and effects—the work to which I refer, at once simple and profound, is "*THE PAST, THE PRESENT, AND THE FUTURE*," which, instead of obscuring the subject it professes to explain, and rendering, in the mind of the inquirer, "confusion worse confounded," reveals *the law of the case*, and political economy, heretofore to plain minds only abstruse, and to minds stuffed with "too much learning" incomprehensible, ceases to be worse than a sealed book, to those who are slaves neither to this theory nor to that; and whose only wish is, to overtake and embrace the naked truth.

Finally, having invited me to address you, you will allow me to declare,

in all sincerity, my conviction that if the tendency of legislative action be to diversify employment, and thus concentrate population in mutual support and dependence, then will you witness a general amelioration of agriculture ; and civilization and the arts which she produces for her own use and embellishment will all flourish in social proximity together. But if, on the other hand, it shall tend to diminish the number of pursuits, population will be dispersed and impoverished, and however the vast extent and natural abundance of a country may conceal its existence and its ravages for a time, you may feel assured there is yet a worm gnawing at the root, that will lead finally in our blessed country, as it has done in others the most favoured of God, to decay and ruin—to anarchy, slavery, and despotism. Let me conjure you, then, to force your public men to the enactment and steady maintenance of a policy that will draw the prosperous consumers employed in other industries, close around the plough and the harrow. Then it is that you will have a land abounding in schools and churches, and blessed with knowledge—with religion—with wise laws, and liberty well secured because—*well understood!* Otherwise, in the more expressive words of Holy Writ, your cities will “be wasted without inhabitant, and the houses without man, and the land be utterly desolate.”

ANALYSES OF POTATOES.

THE tubers of the common potato, the *Solanum tuberosum* of botanists, as analysed by Prof. Henry and J. W. Hardy, of Va., contain of

	Hardy.	Henry.
Water	74.00	73.12
Starch	12.50	13.30
Woody fibre	7.50	6.79
Gluten, albumen	1.00	(Albumen) 0.92
Sugar	2.40	3.30
Fatty matter	0.60	1.12
Salts	2.00	1.40
Volatile poisonous matter	—	0.05

Payen and Persoz found *Diastase* in the neighbourhood of the bud, and Otto discovered *Solanin* in the bud itself. To the presence of the latter is attributed the ill effects from the use of germinated potatoes, as food.

It thus appears that the chief components of the potato are starch and water, and according to Payen these always exist in an inverse proportion, where there is most starch there is least water, and *vice versa*. The following are some of the results obtained by him :—

	Starch.	Water.
Rohan Potatoes	16.6	75.2
Large yellow	23.3	68.7
Scotch	22.0	69.8
Irish	12.3	79.4
Siberian	14.0	77.8

Mr. Hardy also obtained the following results from an analysis of the ashes of the common and the sweet potato, the *Convolvulus batatas* :—

	COMMON POTATO.		SWEET POTATO.	
	Roots.	Tops.	Roots.	Tops.
Silica	6.8	12.5	5.4	10.5
Potassa	52.5	45.3	54.6	46.8
Soda	0.5	0.7	0.8	0.6
Lime	2.0	2.5	3.5	4.0
Magnesia	4.5	2.0	4.3	3.4
Oxide of iron and alumina	1.0	6.0	1.5	7.0
Carbonic acid	12.5	12.0	6.0	8.0
Phosphoric acid	12.5	9.6	15.5	11.0
Sulphuric acid	7.0	9.0	8.4	8.7

Connected with this, we give the result of the investigations of the celebrated English chemist, Mr. Kemp, upon the *potato blight*. Like the epidemic which still lingers amongst us, its cause is in a great measure obscure; but like it, the indications lead us to look for it in atmospheric phenomena, and the changes effected on animals and vegetables by variations of temperature and moisture, and to this conclusion the deductions of Mr. Kemp lead.

1. "That the morbid affection consists of *a premature tendency to assume the organic changes which are consentaneous with, and essential to the process of germination*.

2. "That the presence of fungi and insects do not account for these changes, and cannot therefore be considered as their exciting cause.

3. "That the cause must be sought for amongst *those agents which induce the process of germination* in seeds and tubers.

4. "That further analytic investigation is necessary, in order to elicit the mode of action of such agents, as well as the peculiar conditions under which their agency becomes developed."

"POPULATION MAKES THE FOOD COME FROM THE RICH SOILS."

"FROM the extensive works now going on, on the meadows below the town, the beautiful lawn of green carpeting bids fair to be very much extended during the next season. We have scarcely ever beheld a more beautiful landscape than a portion of these luxuriant meadows now present. Our farmers, we perceive, all over the country are just waking up to the immense value and importance of their low lands. Ditching and draining, and burning bogs are among the numerous signs of improvement to be seen almost everywhere."

We cut the above from "The Herald," printed at Newton, Sussex county, New Jersey, and we do so because it illustrates so forcibly what we have been endeavouring to teach our Southern friends, *viz.*: that it is "population that makes the food come from the rich soils." That county abounds in iron ore that would be useless but for its proximity to the anthracite coal region of Pennsylvania. With the opening of that region the ore has become valuable, and the furnaces have brought the consumer to take his place by the side of the producer, and thus have made a market on the land for the products of the land, and therefore it is that "ditching and draining, and burning bogs," are everywhere to be seen. Let our Southern friends follow the example of the people of New Jersey—let them learn to convert their fuel and their ore into iron—let them learn to convert their food and their cotton into cloth—all of which they will speedily do if they will but take for themselves *protection for the sake of protection*, rejecting absolutely the fraud of protection for the sake of revenue, (which Governor Mahlon Dickerson, of New Jersey, pronounces "a modern discovery, or rather *invention*,") and we shall soon see them holding meetings for discussing the means of increasing, and not of reducing the product of their great staple, cotton. Why form societies to learn how to make labour more productive, of commodities whereof we now make more than we can sell? Is it not a solecism in agricultural economy, for the same people to be holding fairs to improve agriculture, and conventions to devise the best means of reducing the products of agriculture?

ON SUBSOILING.—ON FARMERS' LIBRARIES.

SUBSOILING, says the reader—I am tired of seeing the word. So you may be, but when you see that an essay on the subject has won the prize of a club of practical farmers, in a country where it ought to be at least as well understood as in ours, is it not worth while to look into it? And besides, ought not farmers to be posted up in every thing new, as it appears, on great points in their profession? Some, at a loss for a better excuse, will say—Oh! what time has a farmer for reading? And pray what time has the physician or the lawyer—even those in the fullest practice? The great William Pinckney, who pocketed and booked his \$20,000 a year, yet found time to read every line from the pen of Byron, and Scott, and Bulwer, and even to study Johnson's big Dictionary, as an amusement. The story is, that this great jurist and forensic orator, unequalled in our country, and unsurpassed in any country, died with a volume of Bulwer in his hand, just wet from the press.

Go into the office of any distinguished, or even undistinguished professional man, and you find case added to case, even faster than they are added on his docket, to contain his library, ever swelling with volumes of new theories or new discoveries in the line of his profession. Now how is it with the farmer? There you shall find, from year to year, and these chiefly for the use of the good housewife, the Holy Bible—perhaps Calmet's history thereof—"The Pilgrim's Progress," "Enfield's Dictionary," minus one cover, and perhaps a few leaves, and maybe an old copy of "Goldsmith's Rome" and "Scott's Reader," and some book of pictures for the children—reserving for himself, as above all most worthy of respect and obedience, *the leading paper of his party*, whatever that party may be! Yes, these party men, among tillers of the soil, you will always hear speak of "*my party*"—"our party"—believing implicitly in whatever their organ tells them—to-day it is a whale, and to-morrow smoke—while all the time *the party owns them*, and they are made, without knowing it, to work as wilful horses are made to work in blind bridles, for the benefit of those who sometimes drive, sometimes ride, and sometimes *lead them*!

He cannot easily change his habits, who has grown up to man's estate in ignorance of the amusement and instruction to be found in print, on the subject of agriculture and its kindred studies; but that should not prevent any man from providing for his sons, while *their* habits are being formed, something besides and better than *party newspapers*. All should take at least two agricultural periodicals—one in, and one out of his State, and all should lay aside, say as much of his crop as may be saved from being wasted by gleaning with one of friend Pennock's horse-rakes, to be laid out annually in good books, allied to agriculture—\$20 to lay the foundation, and \$10 annually after. Less than many now expend for the elevation of small men to high places would well provide wholesome and fresh food for the *mind* of his family, and is it not as worthy of attention as the grosser wants of the sensual man? But why talk to people whose heart is fat and their ears heavy, and who shut their eyes lest they see with their eyes! If the rising generation are not provided with such wholesome food, it shall not be for want of exertion and industry on the part of at least one labourer in the vineyard.

But to return to the subject of subsoiling, from which we have been drawn in the fullness of our anxiety to see better provision made for the intellectual cultivation of those who are destined to be cultivators of the soil; all we have to say is, that this essay attracts us, and is published because it explains the reason of the operation, and shows *why* it is that it answers well in some soils and fails in others. It is the want of knowledge to discriminate that often discourages, if it does not disgust the inquirer, and leads him to renounce as altogether worthless that which is so only under special circumstances. This essay alone will show to the reader the necessity of better preparation at school for his business—a preparation that would enable the young farmer to anticipate results which experience may teach him, it is true, but teach him at a cost that makes it dearly bought, even without taking into the account the years of perplexity and the ridicule of wiser men that he must encounter—an expense that would pay five times over for the education and the books that would have enabled him to avoid it.

Having been lately called upon to read a lecture before a geological society on the advantages of some knowledge of geology and chemistry to the farmer, we will refer to this very case, among others, to show that such knowledge would aid the young farmer in deciding even where he should, and where he need not *subsoil*!

SUBSOIL PLOUGHING.

A PRIZE ESSAY OF THE WENTWORTH FARMERS' CLUB.

BY THOMAS KEIR SHORT.

[From the London Farmers' Magazine.]

As for the advantages derived from subsoiling, much diversity of opinion exists, and, on the whole, very little is yet known. Some practical farmers stoutly maintain that it is labour lost, and money thrown away; others equally competent to judge say that it is one of the most beneficial operations in farming, almost equal to a good manuring, and no system complete without it. Thus we see practical men differ: both may be right, and both may be wrong.

I can produce instances where the use of the subsoil plough has been attended with the greatest benefit, and others where it has been so much money thrown away. Many of its advocates are too much prejudiced in its favour, being under an impression that because it has been of great use to them, it must, as a matter of course, be the same to others; but this does not follow, for, like many other operations in agriculture, science must be called to our aid. Analysis is requisite; and chemistry solves the question.

A friend of mine subsoiled ten or fifteen acres of land which had been previously furrow-drained 30 inches deep—the land termed strong clay—the subsoiling being performed across the drains: two lands were left undone: the land sown with wheat and red clover. The crop looked well all winter, except one end, which had been much damaged by game; the subsoiled part always keeping in advance of the other. The crop is now reaped, but not yet threshed. The produce of the subsoiled part is laid by competent judges at fifteen bushels per acre over that undone, and was ready for the scythe ten or fourteen days before the other, which is of much consequence if a wet latter harvest sets in. The red clover on the two lands unsubsoiled attained the height of ten inches, from the thinness of the corn, and was shaken out for the horses; whereas that on the subsoiled land was only four inches high, from the luxuriance of the wheat crop.

Another friend subsoiled a similar-looking piece of land a few miles distant. The greatest care was taken to perform the work well. The results were that no difference in the crop was perceptible, and that it was time and money thrown away.

These two experiments gave sufficient evidence to the contending parties for and against subsoiling to back their opinions; for in these two cases both were right and both were wrong, both being ignorant of the cause.

We will now examine the cause chemically, which will elucidate the question.

Strong land contains large portions of a mineral called alumina, which is a very compact adhesive substance, possessing strong attractions for water and ammonia. An analysis of the soil where the experiment was successful was found to contain 28 per cent. of alumina, the soil resting on the new red sandstone formation. The other soil where no good was derived, contained 45 per cent. of alumina, and rested on one of the worst of clays—the lias.

I was induced to try these analyses from having seen a paper, some time back, in "The Journal of the Royal Agricultural Society," by Mr. Thompson, who is of opinion that no permanent good can be derived from subsoiling land containing more than 43 per cent. of alumina. I am inclined to think that 40 per cent. is the greatest to which the per centage should

go; and as an instance of this, that the less alumina the land contains the more permanent the advantage.

Land containing less than 35 per cent. of alumina, when ploughed after being subsoiled, and having produced a crop, turns up in a much better state, approaching more to a strong loam than clay, and is much easier to work; and I am of opinion that the cost of subsoiling is saved in the labour alone.

I have been much surprised to see strong land on the lias formation, which had been subsoiled, turn up the year following as compact and tenacious as ever, without a crack or any other mark in it to denote that it had ever been moved; and this can only be accounted for by the presence of alumina in such large quantities, which being divided into very minute particles, having a strong attraction for each other and for water, causes them to unite as firm as ever.

On the light or sand land I have seen great advantage derived from subsoiling also; but in this case we cannot allow alumina to have any thing to do with it, consequently we must look to other causes. At the same time I have seen failures equally as great on light soils as on strong clays.

As an instance of the benefit derived from subsoiling sand or light gravelly land, a level field was ploughed 7 inches deep with the common plough, and followed by the subsoil plough 14 inches more; two lands were left undone in the middle of the field; the operation was performed in November, 1845. In 1846 the land was sown with Swedish turnips on ridges, the ridges crossing the subsoiling, the whole of the field was manured alike with bones and fold-yard manure; nothing particular was noticed in the turnips until the bulbs began to form in the autumn, when it was evident those on the subsoiled land were growing the fastest.

Late in the autumn, in crossing the field, the two lands undone had the appearance of a hollow or valley across the field, being much less in both bulbs and tops, and four tons per acre less in weight. The barley also showed the two lands conspicuously, and the seeds this summer have stood the dry months much better than where the land was not subsoiled. I could give some other evidence, but I do not consider it requisite.

We will now examine the cause of success and failure on light soils.

It is well known that a soil may be rich in mineral constituents requisite for the growth of plants, but from the state of combination in which these minerals are found cannot be assimilated by plants as food; consequently, in their present state, are of little use. Science teaches us how to bring these constituents into use, and the more we know of it the simpler we find the process.

These minerals in their present state of combination are termed "*dormant*," and in many cases only require exposure to the air; for it is well known that the hardest rock in time becomes disintegrated by the action of the air, which is principally attributed to the presence of carbonic acid in the atmosphere. It is to the influence of the atmosphere to which I attribute a large portion of the benefit derived from subsoiling sandy soils, but not entirely; as it is well known that the laws of gravitation carry all bodies heavier than the atmosphere downwards, consequently much of the valuable properties of manure are carried down into the subsoil, particularly a porous one, by percolation, and are after placed beyond the reach of the roots of plants ordinarily cultivated.

By the process of subsoiling, the air is admitted to a greater depth, and in larger quantities than before; the carbonic acid of the atmosphere comes in contact with a larger portion of these dormant constituents of the soil, and by chemical action forms them into a state for the assimilation of plants.

I am also fully convinced that much depends on the time of year when the operation of subsoiling is performed, particularly on sandy soils. As an instance of this, during the process of subsoiling early in January, the operations were stopped by frost; other circumstances occurred to prevent the completion of the field until the end of March; the field was sown with turnips, which told to the row where the stoppage took place, the others not being any better than the part left undone. I have often observed that the greatest number of failures on sand land have taken place from this circumstance.

The best period for subsoiling is from the end of October to the beginning of January, as the land has then the full benefit of frost and snow.

Some persons run the subsoil plough down every furrow; this I do not think is necessary, and it prevents many who can only command three or four horses from performing the operation at all. The system I recommend is to clear the land of weeds and rubbish as early in the autumn as possible, plough it once over, drag it deeply, then throw the land into winter ridges with the common or double mouldboard plough as deep as possible; after which run the subsoil plough down each furrow to the depth of fourteen or sixteen inches; nothing more is requisite until the spring, when it is prepared for turnips. If it is intended to subsoil for barley, the operation must be performed as soon as the turnips are eaten off; but for wheat the old system of the subsoil plough following the common plough down each furrow is all that can generally be done.

I am inclined to believe that many of the cases of wheat being thrown out of the ground by frost, may in a great measure be lessened by using the subsoil plough, as I have observed that it never occurs to such an extent on land that has been subsoiled.

It is caused principally by the expansion of the water contained in the soil during the process of freezing; and as most farmers are anxious to have what they term a firm bed for thin wheat, the light soil which covers the grain expands when it becomes frozen from the resistance of the firm soil below; but where subsoiling has been practised, the water has a much better chance of escaping by being able to percolate the soil more rapidly.

Also the deeper a soil is ploughed, a much better chance is given to the various crops to withstand dry weather, as it is *well known to the gardener that the more he stirs the soil between his crops in dry weather the less water they require*; so it is with agricultural crops on a larger scale. Some soils contain a pan or bed of hard concrete a few inches below the surface; and although the land may be free from springs, is often very wet from the surface water being unable to percolate. On such soils as this, the subsoil plough is invaluable.

I knew a part of a field of this description this spring which had been subsoiled; after the operation, between ten and fifteen tons of the hard concrete was carted off, the stones and pebbles being cemented together with oxide of iron. The operation has been successful, and the land is now as dry as possible, even after the heaviest rains.

One great obstacle to subsoil ploughing is the great draught that some of the cumbersome subsoil ploughs require; in fact, in this age of invention, it has often occurred to me that the various implement makers seem anxious to cram as much cast metal and iron into their productions as possible, as if the railroads and other branches of the arts could not consume it; also as much complication as possible is now introduced into the various branches of agricultural mechanics.

Light draught, firm workmanship, and simple construction, are the three grand points to be looked after in the construction of agricultural implements.

Many varieties of subsoil ploughs have been invented, most of which are now discarded. The best I have yet seen is made by Mr. George Cartwright, of Martin, near Bawtry, Yorkshire; it is composed of cast metal and iron, is of easy draught, three horses, on light gravelly land, being able to plough one acre per day, at a depth of 16 inches, the common plough taking 8 inches deep before it, the total depth being 24 inches. The price of this valuable implement is £5 5s. [\$26.]

Those persons who are inclined to follow the practice of subsoiling will find it to their advantage to attend to the following rules, if they wish their efforts to be crowned with success:—

Strong clay, containing more than 40 per cent. of alumina, derives little benefit from subsoiling.

The period from the end of October to the beginning of January the best. Subsoil across the drains if possible.

Work the horses one before the other; avoid treading the subsoiled land as much as possible.

Look that your men do not alter the depth to save the horses.

Use only such implements as are of the best construction and light draught.

Always see your implements tried and proved before you purchase.

ALABAMA COAL AND IRON TRADE, ETC.

I HAVE long been persuaded that it was the true interest of the South to engage extensively in the business of manufacturing. By an appropriation of the proceeds of two-thirds of the cotton crop for a single year, in the building and furnishing of factories, she could manufacture one-third afterwards, merely by repairing the wear and tear of the establishment from time to time; and thus add 100 per cent. to the annual income derived from the production of the great staple.

In addition to this, the South is better adapted, and at much less expense, to the growth of wool. I am aware that a vulgar notion prevails, that a high northern latitude is indispensable to the production of a fine description of wool; but those who have troubled themselves to inquire into the matter, know that this assumption is not well founded. The entire South and South-west, especially the elevated and hilly portions, which are regarded as unsuited to the growth of cotton, are admirably adapted to sheep husbandry. Those who have been attentive readers of our agricultural papers, or have read some of the late interesting publications upon this subject, are ready to believe what we assert. It is only necessary to offer an inducement to agriculturists by the erection of woollen factories, to obtain indisputable evidence of its truth. A few days ago, an intelligent, practical gentleman, who has had considerable experience in rearing of sheep, and who is now engaged in the business, remarked to me, that wool could be grown profitably in Alabama, at 20 cents per pound; all he required was a certain cash market, the price was a secondary matter.

The South confessedly produces the heaviest wheat that is grown in the United States, and, unassisted by manure, yields quite as much as the fresh or exhausted soils of a similar character at the North. With the exception of spring frosts, the wheat crop is equally as certain, and such a frost has blighted it but once in twenty-one years; and it would really seem that its effects could be guarded against by arresting the growth of the wheat during an occasional unusually warm winter, which pushes it forward prematurely,

so as to subject it to the influence of frost. To encourage this branch of industry, it is only necessary to erect flouring mills, and offer a price for wheat, payable in cash. To induce the erection of such mills, to any great extent, there must be a convenient and constant market for flour.

The coal trade in Alabama could be made a source of immense profit, if facilities for carrying it to market were commensurate with the demand. The coal is of the most superior quality, of the bituminous kind, much nearer the Gulf than any that has yet been discovered, and north and east of Tuscaloosa is of untold extent. Iron ore, too, of the richest and most approved varieties, is found in great abundance in the immediate vicinity of the coal, and would be made into pig metal and bar iron, if there was a foundry convenient to purchase the former.

How shall these sources of wealth be made available to Alabama? The answer is at hand. By directing capital and enterprise, so as to promote and advance them. To produce this, it is indispensable, in the language of the sagacious and profound author of "The Past, the Present, and the Future," to improve "the machinery of exchange;" that is, to lessen the expense and labour of getting to market. To induce manufacturing in Tuscaloosa, to any extent, and increase the iron and coal trade, there must be facilities in this way, far beyond those now enjoyed. A plank or railroad should be made through the coal to the iron; thence to the marble, some 30 or 40 miles in extent; and then by boats of suitable draught, there should, if possible, be constant transportation up and down the Black Warrior and Tombigbee. The former is entirely practicable; but without inquiry or examination, it has been generally assumed that the latter is not. Is the assumption well founded? Upon inquiring of several persons who have had much experience for a number of years in navigating the river between Tuscaloosa and Mobile, I was informed that if \$2500 or \$3000 were judiciously expended in removing logs and reclining trees, there would be no obstruction to the downward and upward passage of steamers drawing not more than 15 inches of water, at all seasons of the year. In many places it would be necessary to unloose the barges that were towed, and float them through separately; this would of course retard a passage, but not so much, it is believed, as to induce an abandonment of the enterprise. I was so fully satisfied from what I had seen elsewhere, that a steamer combining the necessary power with lightness of draught could be built, that I addressed a letter to the proprietors of the "Novelty Iron Works," in the city of New York, for information upon the matter, and have received from them the following answer: "A boat 100 feet long, 20 feet wide, could be made to carry an engine sufficient to tow coal barges, and to bear a moderate number of passengers, without drawing more than thirteen inches." It is scarcely necessary to say that the "Novelty Iron Works" is perhaps the most extensive iron foundry, steam engine, and general machine manufactory in the United States; and the opinion of its proprietors may therefore be relied on.

Twice the sum necessary to remove the logs and trees could be raised in Tuscaloosa, Mobile, and intermediate points, with very little trouble. Masters of steamboats could be found, whose interest would induce them carefully and judiciously to supervise and direct its expenditure in the removal of the obstructions. Mobile is largely interested in promoting a constant trade in iron and coal from the interior. It would give her somewhat more of a business air in the summer and early months of autumn. Is not her interest sufficient to induce her to give an impulse to the improvement of "the machinery of exchange?"

A. B.

We take the above from "The Alabama Planter," into which it was copied from "The

Tuscaloosa Observer," and one reason for so doing is that it contains instruction for the people of almost every portion of the Union. Alabama has coal, and New Jersey has iron and zinc, both of which would long since have been worked to a vast extent but for the system that has prevented us from making a market on the land for the products of the land. Pennsylvania, Maryland, Virginia, Ohio, Kentucky, Indiana, Illinois, and other States, abound in coal and ore, and we should be now making and using millions of tons in lieu of the tens of thousands that we now import, had not the manufacturer of iron and the miner of coal been broken down at every change in the policy of the people in the West of England. The richest soils of all these States remain untouched, because men have been driven to form new States, when they would have preferred to remain at home, to aid in filling up older ones, and as it is "population that makes the food come from the rich soils," it is to this system of depopulation that we owe the fact that these soils remain uncultivated.

DIVERSITY OF PURSUITS.

[Correspondence of the Alabama Planter.]

Sumter County, August 31, 1849.

THE advances that are from time to time making in diversifying and increasing the number of objects of Southern industry are a favourable omen of our future prospects, and when new pursuits prove profitable it is especially gratifying. That the remuneration obtained for labour bestowed on our great staple, cotton, has been too light is but too clearly manifest, and the conclusion is admitted on all hands, that a continuance in our former course of increasing the product, so as to meet the deficiency in the price, must be abandoned; but what we were to do was not so easy to decide as the fact that we were now doing very unwisely.

A few, however, determined to strike out of the beaten path of erroneous custom and try a new way. Among these are a number of gentlemen from Sumter county, with perhaps a few others from the surrounding country, who have made an essay, or rather successful effort at the turpentine business. Nothing of consequence was done, in the way of preparation, until late in the season; yet it is understood that, although the season has been rather unfavourable, from the extreme wet of a part of the summer, and nearly all the hands engaged in the business are new beginners, and all the fixtures and preparations entirely new, they will, nevertheless, gather about 150 barrels to the hand.

Moreover, a portion of them have in a good state of forwardness an establishment for distilling the turpentine. It is expected that the concern will be ready to go into operation in a week or two. The owners propose, besides working their own turpentine, to buy of others, and, as I understand, will give two dollars per barrel delivered at their distillery, which is of course as convenient to many of the producers of the crude article as possible.

The fixtures now being put up are calculated to consume twenty barrels of turpentine per day, and produce from them six gallons of spirits per barrel, or one hundred and twenty gallons per day.

How far the distillery business may prove profitable is yet to be seen; but I think it probable, with care and economy, that it will be a better business than making cotton has been for the last ten years. The whole business of gathering and distilling is in the hands of intelligent and practical men. It is true that few, perhaps none of them, have had much actual experience in either branch of the business, but they are well acquainted with all the general theory, common usages and results of it, and as bold, sensible, practical men are without strongly fixed preconceived opinions,

they are likely to adapt their modes of operation to the circumstances that surround them—make improvements on old plans if necessary, or if likely to be more successful, adopt new plans and carry them out with vigour.

For a moment, let us compare the probable results of cotton raising with this turpentine business. It is not at all probable now that the hands in Sumter or any of the adjoining counties, either in Alabama or Mississippi, will make two bales of cotton of 500 pounds each to the hand, and ten cents is as high as it will probably bring, or \$100 to the hand. The hands engaged in the cotton culture usually make their own bread and the corn fed to the horses and mules on the plantation, and sometimes all their meat, but commonly only part. The mules, ploughs, wagons, gears, and farming tools, and all the *et ceteras* of a farm, must in whole or in part come out of the cotton. Very different is the calculation of the other business. Five or six dollars will supply a hand with tools for years—one good, strong wagon and a team of four or six oxen will do the hauling for several hands, no mules to feed or gears or ploughs to buy and keep in good repair. The parties may, if they choose, raise a little corn for bread, and any quantity of potatoes. Their oxen can live in the woods when not in actual use, and the hands gather a crop nearly or quite twice as productive as cotton, and remarkably steady and certain, in a most healthy country, and free from a thousand costs and charges that attend making cotton. SUMTER.

We cordially agree with the writer of the above, but would recommend him to consider if the same labour would not erect a furnace or a factory, with results far more advantageous. Why must the cotton go to seek the loom? Why not compel the loom to come to the cotton? He brings the distillery to the pine trees that he may make turpentine. Why not haul the trees to the distillery, as he now hauls his food and his cotton to Lowell and Manchester, receiving back a pound of cotton for a bushel of grain? Common sense teaches that his interest will be promoted by bringing the distillery to the turpentine. Why, then, not bring the furnaces to the ore and the coal? He answers that he will be ruined because of the unceasing changes in the price of iron. Let him, then, call aloud for help, and Congress will afford it.

NORFOLK COUNTY (MASS.) AGRICULTURAL SOCIETY.

THIS youngest sister of the family associates to promote improvements in agriculture and horticulture made her brilliant debut on the 26th of September, under the always auspicious Presidency of Col. MARSHALL P. WILDER.

We feel called upon to give it a passing notice on more accounts than one, but especially as it was not only their maiden exhibition, but was greeted and graced by the presence of a large number of the fair sex of the county; and thus it seems always to be with the Colonel. Here we are delving night and day, labouring like a Turk to draw the loom and the anvil close around the plough and the harrow, while some of our oldest and most esteemed friends would have us keep them wide asunder—but Col. W. has only to move and the ladies flock around him, and, moving in concert, stimulate and reward him with their presence and their smiles. Let envy, or malice, however, say what they may, when that is the case, we may always feel assured that the man is about doing something good.

This Norfolk county, strange to say, was the only one in the old Bay State without an agricultural association. There, we believe, as in New York, the State gives to each county a sum equal to what its society can raise, not exceeding, however, in any case, a certain amount—in Massachusetts we believe the maximum given by the State to any one county is \$600. To return to this last-born pet of the State, here we behold, almost

without notice, and as by magic, the tree that Col. W. and his active and able associates, B. V. French, and others, planted but a year ago, is already in full bearing of the choicest fruit—like Minerva sprung at once in full panoply and in all her beautiful parts and proportions from the head of Jove. Surely these gentlemen must have discovered some new principles—some magnetic power to accelerate the processes of vegetable growth; and may it not be added, as surely, that the men, wherever found, under whose genial breath the smallest spark of inclination to foster the useful and elegant arts of agriculture and floriculture, thus blazes up and spreads far and wide, are fit to govern States!—for does it not prove that under their management all the resources of wealth and power would be skilfully developed and administered?

For ourselves, the idea, not now expressed for the first time, has always been that these holiday gatherings of the yeomanry of the country should wind up with a social public *dinner*—with toasts and sentiments, to call out brief remarks and repartees, all around, giving rise to that agreeable exhilaration which seems to flow so spontaneously and freely *after* the inward man has been satisfied with the creature-comforts of a substantial repast; and when men, on other occasions reserved, are prompted by compliments and friendly collisions of opinion, to take their lights from under the bushel, and putting their best foot foremost, proclaim aloud what experience has taught or reflection suggested as connected with the interests they have assembled to illustrate and improve. No part of English agricultural annals is more at once entertaining and instructive than their accounts of that portion of their great meetings which is emphatically denominated “THE DINNER,”—and who can read the spirited account of the one to which we are referring, as we find it in the Boston Journal, and fail to envy the pleasure of those who were participants.

“Not the least pleasing feature of the exhibition,” says *Messrs. Sleeper and Rogers*, (and we have not the least difficulty in believing them,) “was the *grand display of fine and beautiful women!* If the specimens which we saw yesterday are fair samples of the whole, Norfolk county certainly is not to be outdone in this feature of the ‘Show’ by any which we have yet seen.”

He must be one of the seven sleepers who would not be sensible to such a presence, and then for the men—the account proceeds:—

“The scene at the tables was very brilliant, in consequence of the presence of large numbers of ladies who participated with their fathers, husbands, and brothers, in the festivities of the day. We wonder not that they were eager to attend, for we never remember to have witnessed on any such occasion—scarcely on any occasion except at the Capitol—such an array of talent and celebrity. Conspicuous among the invited guests were Daniel Webster, Edward Everett, Robert C. Winthrop, Levi Lincoln, Governor Briggs, Lieutenant-governor Reed, Horace Mann, the Quincys, (father and son,) and others. There were also present Ex-Governor Hill, of New Hampshire, Hon. J. W. Briggs, of Ohio, Mayor Dearborn, of Roxbury, Rev. Mr. Pierpont, the Presidents of several Agricultural and Horticultural Societies, Hon. John C. Gray, of Boston, President of the Massachusetts Agricultural Society, Charles F. Adams, of Quincy, and many more well known citizens whom we cannot stop to particularize. A fine band of music was in attendance.

“A blessing was invoked by Rev. Dr. Burgess, and then the eatables were satisfactorily attended to.

“After this, Col. Wilder, the President of the day, called the attention of the company to the after-entertainment, in these terms:—

“*Ladies and Gentlemen*:—I congratulate you on the auspicious circumstances that attend our assembling around this board. We are not only honoured with the presence of the dignitaries of the land, who have come up to aid and encourage us in our new enterprise, but with that of the ladies, whose bright smiles and cheerful countenances add so much

to the pleasure and brilliancy of such occasions. I shall not trespass on the time which will be so much better occupied with the remarks of others, but proceed at once to offer such sentiments as will, it is hoped, elicit replies from our distinguished guests.

"The first sentiment was this:—

"*Agriculture* :—The first of arts and the first of sciences—the mother and nurse of the human race. The Romans remembered with joy and admiration the periods when their Consuls and Dictators were taken from the plough; may our descendants have occasion to remember with pride and satisfaction the present age, when the first names of the Republic are enrolled in the list of its farmers."

What friend of the plough can fail to hail with pleasure the *sign* to be seen, in the presence of such men, coming down—down, did we say?—in coming up to recognise the *paramount importance of agriculture*; and to listen to the testimony of such men as Governors Lincoln, Briggs, Everett, and "black Dan" himself—so invincible in every field where the Constitution is to be defended, but for himself in no field more happy or more captivating to his friends, as we know, than when playing the *farmer at Marshfield*—and then to have enlisted in the cause, that MANN among men, whose peculiar and enviable boast it is, to have *led the advance in the glorious cause of education*!—for, believe us, readers, it is *in the schools*, after all, that we must sow the seed of all enlightened and durable reform—and believe us, further, that the will and the power to establish such schools can only be realized by a people who are convinced of the truth, and willing to carry out the doctrine we are preaching in "The Plough, the Loom, and the Anvil." Yes, you must have diversified employments, flourishing and prosperous, to beget dense population, without which there can be no good school system well supported. Your tendency under the influence of wise laws, must be *centri-petal*, and not *centri-fugal*!—it must be to unite, and not to disperse yourselves and your children.

Some there are who will tell you that all government is an evil, and that laws should only have in view the beautiful and benign end of *hanging and shooting* our fellow-creatures—murderers and pirates—as sheep-killing dogs are hung and shot. Our doctrine is, that when men have emerged from a state of barbarism, and, passing through the pastoral state, have betaken themselves to the civilizing arts of cultivation and commerce, to support augmenting population, it is government which then takes the place of individual wilfulness and physical strength, and thenceforth society is to be meliorated, and all its arts and interests advanced, more or less, by more or less *perfection in the laws*! It is the laws which constitute the soul of the Republic. They are the instruments of public felicity, and their perfection depends on the *education of the people*, which is to be referred again to the diversity of employments, giving to each other mutual countenance and support, *here at home*, under a government which they themselves control, and a policy which leads to union for common welfare. With more perfect education will come more productiveness to labour, and an *increasing horror of war*.

We have no room to advert to any more of the many beautiful and instructive incidents of this fair at Norfolk—selected now because it was the *first*, and to show how much more easy it is to command thousands, where the loom and the anvil have been for years gathering close around the plough and the harrow, than it is to make up hundreds where the policy is to compel the producer to go abroad in search of his customer. Not long since, with a view to test the advantages of certain sites for manufactures, at the instance of a valued friend in the West, we made inquiries about the *price of land* near certain cities, and the answer as to Boston was—How much does the reader imagine?—\$1000 an acre in any direction, *three miles distant from the Boston market-house*! So it ought to have been

at Norfolk and Charleston, if they had not always persisted in separating the consumer from the producer, leaving the latter to lay all his eggs of one kind, and to carry them all in one basket.

But, after all, we cannot quit this subject without expressing our humble but hearty concurrence in the sentiment expressed by Governor Briggs, who said "he saw, on the present occasion, one feature of the celebration which did humble him with regard to the older society of which he had spoken so much. He saw with infinite pleasure the wives and daughters of the farmers sitting, as they ought to do, with their fathers and husbands at the table. In Berkshire they had not yet advanced quite so far, but he felt confident that the beautiful example of Norfolk in this respect would everywhere be speedily followed. The banishment of wine from public entertainments had opened the way for the presence of woman, and who was there that would hesitate for a moment to make the exchange?" Nor *will* we quit it without one more word to say:—Reader, you perceive with what alacrity great public men come forward on these holiday occasions to eat salt with the "hard-fisted yeomanry!" and to testify their devotion to agriculture! You would think it was the great burden of their thoughts—that Ceres and Pomona were the idols of their souls' worship, but—when you send them to the field of legislation, *what do they do for the cause?* They vote millions for armies and navies—for army and navy schools to teach the use of cannon and sword, and how to construct *military* roads and *gun*-carriages, to analyze *gunpowder* and to load a *mortar*!—(\$500,000,000 since the war with England in 1812—enough every year to build *seven hundred miles of railroad*!)—but do any of them move for appropriations for a great normal school in each State, where teachers might be prepared to take charge of country schools, there to teach your sons the sciences involved in the use of the *plough*, in the construction of *civil* roads and bridges for *civil* uses—the *farm-gate* and the *farm-wagon*—how to analyze *soils and grains*? No, not a man of them! That is, as the Frenchman says, *une autre chose*!—quite a different thing!—one is popular—there is something charming in the very sound of the drum and fife—something attractive in the very sight of a red coat and glittering epaulettes, in vulgar eyes—and so will it ever be until education, which alone, by throwing light upon the mind and heart, can invest men with the attributes of God himself, shall shed *its* blessings over the land, enlightening and liberalizing the public mind. Then shall we need, as now we really need, neither armies nor navies, for then will strength, consisting in knowledge and the love of peace, take the place of ignorance and the love of blood: and then shall the plough and the spade take the place of the scaffold and the axe. Let us wait and see what these gentlemen will *do* when next they meet in Congress. Let us see whether all their fine speeches are to end in—*smoke*!

"*Draining, lime and guano, in our arid and dry climate, destroy all vegetation!*"

AMERICAN INSTITUTE.

☞ "Seventy-eight tons of guano and about one hundred barrels of Kettlewell and Davison's "renovator" were landed at this place [Leonardtowntown, St. Mary's county, Md.] on last Friday, for farmers in the immediate neighbourhood. Not less than three hundred tons of the former, it is believed, will be used in St. Mary's the present fall."

ON THE PARTURITION OF ANIMALS.

A Lecture on the Anatomy and Physiology of the Maternal Organs of Reproduction in Animals, with the Principles of Practice applicable to cases of Difficult and Preternatural labour, more especially in the Cow and Ewe: By JAMES BEART SIMMONS, Lecturer on Cattle Pathology of the Royal Veterinary College, London: Honorary Member of the Royal Agricultural Society, &c.

WILL some farmer-doctor favour us with his views as to the reasons why, in England, diseases among domestic animals, and especially among what we commonly call *cattle* and sheep, are so much more various and prevalent than in the United States? That such is the fact, every one must have perceived, who is in the habit of reading English journals and books on husbandry.

Here before us, is a dissertation of thirty pages, with eleven costly engravings, to illustrate the subject of *parturition* in the *cow and ewe*, which in England is attended so frequently with danger and death as to have made it a subject of much importance and discussion. Who ever hears of cows and ewes being lost in such cases in this country? True, it does happen sometimes, but so very rarely as scarcely to cause the least apprehension or solicitude, still, the subject is one which is worthy of being studied by every farmer, as are a thousand others that serve to give to his pursuit interest and variety; while some would persuade him that above all occupations his is the most monotonous and stupid. And here it occurs to us to suggest that if the farmer were represented as he should be, in all State Legislatures, by well-informed men of his own profession, they would take good care, in all cases of granting charters and privileges, to make provision for the *interests of agriculture*—as, for example, in granting railroad charters, they should require the company to provide, as is done in New England, a good, convenient, commodious, and well-appointed *station-house*, with the necessary officers and fixtures, every five miles along the road, for the accommodation of passengers and the reception of agricultural and horticultural articles—even a pound of butter or a dozen eggs. Such conveniences create business—instead of that we wait for business to create them. And how, says the reader, are you going to connect with this the study or illustration of the diseases of domestic animals? Hold on a minute—I would have a clause inserted in every charter for a medical college, that it should embrace a *Professorship, with lectures on comparative anatomy*, with the privilege of free attendance, under proper regulations, of all country people or sons of farmers who might wish to attend.

On this subject the celebrated Dr. Rush, that great lover of science and of peace, in one of the most eloquent and amiable lectures we ever read, said:—

“We are further called upon to study the causes, seats, and remedies of the diseases of domestic animals, by the duties which we owe to our country and to humanity. The products of agriculture and commerce are often lessened by a fatal epidemic, brought on by diseases which blast the character of animal provisions; and many poor families have been left to suffer all the evils of penury and famine, by the death of a single horse, upon whose labour, of a cow, upon whose milk, or a hog upon whose flesh, they had relied exclusively for subsistence, all of whom perhaps perished by diseases that might have been cured.”

Why does not the American Institute provide for such lectures?

But our purpose was merely to extract from the lecture of which we have given the title at the head of these remarks, what we find there on the *time of gestation* or pregnancy of certain animals, which it may be of importance

to every practical farmer to know, with a little more exactness than they now usually do. General tables have been, we know, repeatedly published, but we are not aware that it has been done in "*The Plough, the Loom, and the Anvil.*" We were well aware of the variation of the time of gestation, as proved by the registers kept under the orders of Earl Spencer, but do not recollect to have before seen it stated, as is here shown, that it depends sometimes on the influence of *the male* partner in the business. It may be well for "us Christians" to remember, however, that there is a *minimum* fixed for the birth of at least the first healthy, full-grown offspring under which its appearance in this wicked world is bound to be accompanied with violent suspicions of premature intimacy. But as the doctor said, "It's an accident not apt to happen a second time between the same parties after lawful wedlock."

There is one more suggestion in a part of this lecture, not here embraced, which it may be useful to state for general information, and with which "the profession" are of course familiar. The lecturer reiterates the caution, that in all cases of difficult labour, with women as well as animals, artificial assistance should cease *in the intervals* of natural efforts; and should only accompany the maternal throes for relief.

"The period of utero-gestation, or length of time that the fœtus is detained in the uterus, depends upon several causes, and differs in nearly every variety of animal unless belonging to the same tribe or family. The average period that the mare carries her young may be stated as being near to *forty-eight weeks*, the cow *forty*, the ewe *twenty-two*, the bitch *nine*, and the sow *sixteen weeks*. It certainly is a remarkable fact, and one which shows the mighty power of the all-wise Creator, that, in animals placed so high in the scale of organized beings as the canine race, full and perfect development of their young should be effected in the short space of sixty-three days. If, however, we descend the scale, we shall find that this is comparatively a long period to be occupied in the perfecting of the offspring of the lower animals.

"The late and much lamented Earl Spencer has recorded in the pages of your journal his observations on the duration of gestation in no less than 764 cows; and we are much gratified in being able to say that he has thereby rendered most efficient aid to science, as well as considerable service to the practical breeders of cattle. I refer to that paper for full details, but I shall nevertheless make an extract or two in consequence of the important bearing these statements have on this part of our subject:—"From the inspection of this table," his lordship says, 'it will be seen that the shortest period of gestation, when a live calf was produced, was 220 days. Any calf produced at an earlier period than 260 days must be considered decidedly premature, and any period of gestation exceeding 300 days must also be considered irregular, but in this latter case the health of the produce is not affected. It will also be seen that 314 cows calved before the 284th day, and 310 calved after the 285th; so that the probable period of gestation ought to be considered 284 or 285 days, and not 270, as stated in the book upon Cattle, published under the superintendence of the Society for the Diffusion of Useful Knowledge.'

"The facts here mentioned with reference to the great differences in the time of gestation cannot, even in the present advanced state of science, be satisfactorily accounted for. Dr. Carpenter, writing on the same subject, remarks that 'the average length of time which elapses between conception and parturition in the human female appears to be 280 days or 40 weeks. There can be little doubt, however, that gestation may be occasionally prolonged for one, two, or even three weeks beyond that period; such prolongation not being at all unfrequent among the lower animals, and numerous well authenticated instances of it, in the human female, being on record. Upon what circumstances this departure from the usual rule is dependent has not yet been ascertained; but it is a remarkable circumstance, ascertained by the observations of cattle-breeders, that the *male* has an influence upon the length of gestation—a large proportion of cows in calf to certain bulls exceeding the usual period, and a small proportion falling short of it. Hence we must attribute the prolongation of the period to some peculiarity in the embryo, derived from its male parent.*' Alluding to the opinion which is also entertained with

* Carpenter's "Manual of Physiology," p. 478.

respect to the sex of the fœtus influencing the time of gestation, Earl Spencer observes, 'there is a prevalent belief among farming men, and I believe farmers, that, when the time of gestation of a cow is longer than usual, the produce is generally a male calf. I must confess that I did not believe this to be the case, but this table shows that there is some foundation for the opinion. In order fairly to try this, the cows who calved before the 260th day, and those who calved after the 300th, ought to be omitted as being anomalous cases, as well as the cases in which twins were produced; and it will then appear that, from the cows whose period of gestation did not exceed 286 days, the number of cow-calves produced was 233, and the number of bull-calves 234; while from those whose period exceeded 286 days, the number of cow-calves was only 90, while the number of bull-calves was 152.'

HEAR BOTH SIDES.

WE have, on various occasions, urged on the Editors of *The Union* the propriety of imitating our example, and permitting their readers to see both sides of the tariff question, copying our papers as we do theirs, but, we regret to say, our advice has thus far had no effect. A recent number of that paper has a long article devoted to the abuse of this journal, its Editor, and its doctrines, and proving, to the writer's entire satisfaction, that the farmer is to be enriched by sending from the land the products of the land, instead of making a market for them at home, thereby enriching the soil and himself, instead of exhausting it. By some mischance that paper did not meet our eye until some time after its publication, and then only in consequence of having been informed by a friend that it had appeared. Not exchanging with *The Union*, such an accident might readily occur. It is now too late to make of it at present any other than this brief notice, but on the first opportunity it shall be given, with the necessary comments, to our readers. They, at least, shall hear and see both sides. Which of our opponents will venture to imitate our example?

The editors of that journal are hard-headed pupils. They know so much that they are in danger of never being wiser than at present. We live, however, in the hope of being able to satisfy them and their correspondents, even if one of these latter be, as is said, the late Secretary of the Treasury, that "there are more things in this world than are dreamt of in their philosophy," and that if they wish to know any thing of political economy, they must endeavour to obtain some acquaintance, even though slight, with its first elements. That we do not see *The Union* more regularly has not been our fault. This journal was sent for many months, supposing that in common courtesy it might be deemed worthy of a tri-weekly at least, in exchange. The Senior Editor, our "*quondam*" friend, more than once volunteered the promise of a kindly, though it might be an "antagonistical" notice; but in the urgency of more important engagements could never find time to give it even a passing salutation, until correspondents were at last let in to denounce it and its doctrines as "absurd," "contemptible," &c., terms which we commend to the particular notice of the Senior Editor, of whom, whatever may have been our differences of estimate and opinion of certain men and measures, we should regret ever to have spoken or to have been the medium of words spoken unkindly or disrespectfully. If time and late events have rendered somewhat more identical our estimate of some exalted personages, bringing him to think with us, ought it not to admonish him that few things in this life are free from liability to change, while civility is an incumbent virtue on us all.

THE CONDITION OF THE SOUTH.

STATES.	Total No. of acres in	Acres owned.	Paid to Govern- ment for portion bought of it.	Acres remain- ing unsold, Jan. 1, 1849.
Alabama .	32,462,080	15,911,520 .	\$16,888,047 .	17,450,560
Mississippi .	30,174,080 .	15,811,650 .	16,402,691 .	14,326,430
Louisiana .	29,715,840 .	6,263,822 .	4,186,394 .	23,452,018
Arkansas .	33,406,720 .	5,942,117 .	3,769,695 .	27,464,603
			<u>\$41,246,827</u>	<u>82,693,611</u>

"This table shows some extraordinary facts that are not often considered by those who abuse the South, namely, that besides the government owning 82,693,611 acres of land, which would be sooner purchased up if their agricultural productions could be promoted; these States have paid \$41,246,827 for the lands they have alone purchased of the government; and if this sum had been invested at the average time of their payment, say 1835, in six per cent stocks, payable semi-annually, and such dividends had been re-invested and compounded till now, it would reach a total sum to-day that would equal fully all the bona fide capital of the North invested in cotton factories and shipping. I allude to this to present a cause why the South may appear behind the North in the progress of her factories, &c.

"Cotton factories and iron forges are, however, becoming numerous. Coal mining is attracting great attention, and from the great profits arising from investments in ships, and our wonderful facilities for building, with our splendid timber on the spot, &c., it is not unlikely we shall ere long enter the lists as competitors with our northern brethren in this exceedingly profitable branch of their wealth. In Alabama our citizens are generally exempt from embarrassment, and in certain quarters large amounts of money are known to be hoarded."

We take the above from that able journal, "De Bow's Commercial Review," (New Orleans,) which we desire to commend to the attention of our readers, as containing a vast quantity of valuable information for which they would elsewhere seek in vain. We know not how any one of our readers, desirous of useful information, particularly in relation to the Southern States, could more advantageously employ the same amount than in adding this valuable work to his library; and it ought, most especially, to be in every public library in the Union.

The above table does present "some extraordinary facts." It shows that in four States there remain unsold 82,000,000 of acres, much of it the richest land in the country, while men are flying by tens, and almost hundreds, of thousands, to California, the acquisition of which was the result of a war brought on by that thirst for territory which caused the addition of Texas to the Union. We have, and have long had, land in abundance. What the land wants to give it value is population. Men are everywhere flying from each other as if from pestilence, when every man knows that combination of action is essential to the productive application of labour.

The writer of the above desires that we should calculate the price paid for land and the interest upon it, when he thinks we should find that it would prove that the South had invested in land as much as the North in factories and shipping. He forgets, however, that the price paid for land is but the representative of a certain quantity of labour, and that the people of the North have been steadily investing labour in the improvement of their lands, until they have, in some places, brought originally poor lands to a condition that enables them to obtain from one acre as much as the planter obtains from five. If he will look to this, and study what it is that has enabled them so to do, he will find that it is because they have made a market on the land for the products of the land. If, then, he will study how much the planters have wasted in the work of unnecessary transporta-

tion from the place of growth to the port of shipment, and thence to Manchester, and thence back again to the plantation, and to that add interest—and will then reflect that all this might have been saved by the pursuance of a course of policy that would have compelled the spinning-jenny and the loom to come to the cotton, and the spinner and weaver to come to the food, he will be satisfied that the amount has been more than would have placed in the South machinery for the conversion of all their cotton, were it even ten millions of pounds instead of one—and furnaces and rolling-mills that would produce iron by millions of tons—and shipping that would enable them to exchange their cloth and their iron with the producers of tea and coffee, and silks and spices, and all others of the comforts and luxuries of life with which they are now compelled to dispense, because they have pertinaciously refused to follow the course necessary to enable them to return to the soil the refuse of its products, and thus improve instead of exhausting it. The question of protection is a planters' and farmers' question, and when the planters shall *come so to regard it*, the unsold lands of the South will cease to count by millions of acres, and they themselves will cease to fly from the rich soils of old States to the poor soils of new ones, as now they do, and as they must continue to do until they shall become convinced that it is "population that makes the food come from the rich soils!"

THE MARYLAND STATE AGRICULTURAL SOCIETY'S LAST EXHIBITION.

THOUGH duly sensible of the honour of tempting invitations to fairs appointed about the same time, at other places, we felt bound by a sort of filial duty to attend the one which was to come off in our own old native Maryland: for although such exhibitions, it must be admitted, begin, with us, to lose something of their attraction, after being repeated in our view for nearly thirty years, yet was full recompense to be expected in what was anticipated of excellence in this one. And moreover, there was something not easily to be resisted in the thought of seeing there some old friends yet remaining, with whom to revive recollections of a period when, however humble now, we may have been ourselves of some account among abler and worthier performers in similar scenes then enacted on the same boards.

One has indeed only to look back to the pages of the old "American Farmer," even before the existence of any other agricultural periodical, and while yet depending doubtfully for its own existence on the hand that traces these lines, and there will be no difficulty in finding evidences of zeal in the good cause then, as ardent as now, animating patriots no less distinguished—such as Pinckney and Madison in the South, Pickering and Lowell in the East, and Peters and Powell, Lloyd and Ridgely of Hampton, and many others in the Middle States.

The pages to which we have referred, abound, moreover, in statements of crops as heavy, of hogs as prolific, horses superior and much more numerous, cows as deep-milking, and sheep as well formed and as fat as any to be seen at the present day; except, be it remembered, the prodigies in the *ovine* department exhibited by *Major Reybold and his son Clayton*, the latter of whom, though he may never hope to rise to his elevation in one respect, bids fair in this department of industry to follow close upon, if he does not overmark the footprints of his "illustrious predecessor." Truly there was hung up there to the gaze "Old Zack," and the multitude, from the yet unequalled

flock of the Reybolds, one dressed mutton of such extraordinary dimensions, such depth of brisket, such breadth of loin, and such length of body—in a word, of such amazing latitude and longitude, that had it been divested of its head and feet, (left on, it was supposed, to verify the jurisdiction of the sheep committee,) it would have puzzled the great naturalist Cuvier himself to say to what race of animals it belonged! In frame, too expanded for a hog—in weight, for a sheep, past any thing that Jacob himself ever dreamed of, or manufactured by his remarkable cunning as a breeder. But that its fat was of snowy whiteness, it might have been mistaken for a bullock of the old-fashioned, old field breed of the Elizabethan age, since which cattle have about doubled in average weight.

Our old friend John Barney, of that same ilk—in little Delaware—used to exhibit Dishleys, thirty years ago, in the Baltimore market, that then astonished the natives, but even he would have lifted up his hands in wonderment at these modern *Oxfordshires* of the Reybolds, could he have been “there to see.” The wether of their own breeding, to which we have alluded, weighed, alive, somewhere in the neighbourhood of 300!*

Aware as we are of certain influences, especially at that season of the year when farmers are selecting rams to give them lambs, and men to give them laws, we have hitherto despaired of ever getting legislators independent and firm enough to enact a stringent *dog law*, to save the flocks of Southern States from destruction; but it occurred to us, on this occasion, that when there comes to be a good sprinkling through the counties of the precious blood of such sheep as were exhibited by the Reybolds—Col. Ware—Mr. Clements—C. Carroll of “My Lady’s Manor,” and others, the united interest of so many as would then be combined, might begin to make some headway against that *canine* power which now cuts off at least \$100,000 from the sum which might otherwise be added annually, and almost as a net saving, to the farmers of Maryland. Yes, but for that baleful spirit of party, which sets each upon the watch to see the other caught inadvertently in some *unpopular* trap—some gun-tax, or dog-tax—a spirit which has stood in the way of so many reforms, and which threatens yet more direful evils to the country, the State of Maryland might, at a very trifling expense, comparatively, add an average of 5000 sheep in each county, making an aggregate addition of 100,000 to the flocks of the State. While few farmers may have the means and facilities requisite for grazing and fattening cattle, every one might add more or less to his flock of sheep, were it not for the almost moral certainty of having them *destroyed by dogs*! With a good *dog law*, and a small factory in every county, to assure the farmer of a market—even at twenty cents a pound, or less—Maryland might raise the middle or the coarse-wooled sheep, to meet the wants of both the butcher and the manufacturer; or even the fine-wooled sheep, at an *expense less* than is encountered by the Vermont farmer, by an amount fully equal to the whole profit which tempts the latter to look to his wool as one of, if not his principal staple! What infatuation—what want of energy and spirit, then, does it not evince, to deny himself the enjoyment of so great—such a palpable resource, for fear of some *mischief to the party*!—by the enactment of some measure of relief against an evil so general and so pestiferous! Suppose a *party* is injured, who suffers for the most part? The people?—the farmer in his substantial interests? No: nine times out of ten, the misfortune, such as it is, lights on the office-holder and the demagogue! But all this is but another of our digressions, and all will come right when thick-

* Since writing the above, we learn that, some days after the fair, it weighed 166 or 176 (we have forgotten which) pounds net.

ening population and diversified pursuits shall give rise to *appropriate* education. Be it for the reader to say how far such digressions concern the landholders of the State, and how, therefore, they may or may not be worthy of his own reflection—and so we return to the late exhibition.

In respect of the question how far such exhibitions are to be relied upon, to cure any radical defect or obstruction to the progress of improvement in the art and condition of agriculture, (entertaining and useful as they are,) we refer the reader respectfully to our views, for what they are worth, in the discourse which forms the leading article of this number; which has been published at the request of the Bucks County Agricultural Society, who were pleased to pass a resolution saying it had been "listened to with infinite satisfaction."

In the mean time, for our own impressions as to this particular fair, they are so nearly reflected in what follows from "The Baltimore American," soon after it occurred, that we have no hesitation in adopting it:—

"In a review of the great Fair of the State Agricultural Society, which was gotten up on so liberal a scale, which was so attractive, meritorious and gratifying in all its features, and which has just passed off so happily, the first impulse is that of grateful recognition of the industry and zeal of the President of the Society, and his associates most immediately instrumental in the admirable arrangements, and the extensive and costly fixtures prepared for the occasion. Nothing is easier than to express our good wishes before hand and our approbation afterwards, and many may be ready with their pecuniary contributions; but on how few fall all the labour and trouble of personal supervision to see that *all is done, and well done!* Nor is it easy to over-estimate the obligation that is due to those who get them up, when the effects of such exhibitions, not only on the agriculture of the country, but on the industrial pursuits of the city, are properly considered. Such large gatherings of men from all parts of our country, distinguished for their discriminating judgment and pursuit of knowledge—as their very presence here warrants us in presuming—have a tendency to diffuse widely, and at once, not only a knowledge of what is new and excellent in the way of animals and machinery, and agricultural and horticultural productions and improvements, but they diffuse also a knowledge of the trades, institutions, facilities and resources of our city, and impart, may we not hope, favourable impressions of the enterprise and character of our citizens in whatever line of industry employed. What agriculturist can fail to see, in a city absorbing in its bosom this year, the portions which were its suburbs the last, and extending its confines rapidly in all directions—rising now to the neighbourhood of 150,000 souls—a vast body of customers for all the products of his own industry, and whose power to consume is necessarily proportioned to their ability to buy, and whose prosperity must therefore be identified with his own. It is thus that the identity of interests between town and country is made manifest to all, and the feeling of narrow-minded jealousy is forced by these great annual exhibitions to give place to mutual good will. And though in these moral results may be seen the most admirable effects of these exhibitions, in a pecuniary view they are attended with benefits confined not to steamboats and railroads, and venders of agricultural implements, and hotel-keepers only, but extending to all trades and classes.

"It ought not to be omitted, as a proof of the accommodating disposition of the keepers of our numerous hotels, and of the facilities at their command for any emergency, that this sudden accession of company, almost to overflowing in them all, seemed to produce no embarrassment to them, nor give rise to complaint among their guests, either of short commons or long charges.

"The proprietors of steamboats, too, and the directors of the railroads and other public conveyances, met the occasion in a spirit of becoming liberality, making no charges on animals and articles sent for exhibition, and reducing materially the fare on passengers.

"Thousands without distinction of party, and who might otherwise never have had the chance, embraced the opportunity of being presented to and taking sociably by the hand the President of the United States, in whose plain, farmer-like appearance, it was not easy to recognise the intrepid commander at Buena Vista, standing with a handful of brave men, as at the pass of Thermopylae, against an army of 20,000 warriors, yet calmly and firmly declaring—*My wounded are behind me—I will never pass them alive!*"

AGRICULTURAL FAIRS.

THAT of the PHILADELPHIA Society, held on the 5th of October at the Lamb Tavern, has at least the merit of living embers from the first fire kindled in the cause sixty years ago, and out of the best materials, if we may judge from its tenacity of life, sometimes nearly going out, and again blazing up. Who knows but that it may burst forth again with more than its original strength and brilliancy!

A very vexatious accident prevented us from being present at the delivery of the annual address, by the Hon. Joseph R. Ingersoll; but that untoward circumstance served perhaps to increase the pleasure with which we have since perused it. Much of what was to be deemed new and practical was hardly to be expected, in the performance of an orator whose time has been given to law politics and classical research; but do we not owe a lively sense of obligation to the scholars who are easily persuaded to lay aside their scalpels and their briefs, to show us, occasionally, how appropriately the handles of the plough may be garlanded with the flowers of literature?

There is one practical suggestion, which, as it is borrowed from a Lancaster County farmer, must be worthy of attention:—the antidote to the fly in wheat, so sententiously given in the words “burn your stubble.” One difficulty, however, arises, that the egg of the fly is said to be deposited after the wheat sprouts above the ground, and that stubble is not usually followed by wheat, unless in violation of the maxim in farming, that white crops should not succeed each other.

We heartily concur in what follows from his address on the subject of agricultural education. Education, to be useful, should be made as strictly appropriate to the use of the implements and the practice of the art of agriculture as, at West Point, it is with so much efficiency systematized and conducted with express reference to the use of the implements of war. That, in fact, is to be the next and the only hopeful step in the line of general agricultural melioration for our country—appropriate, express preparation and discipline of the mind of the rising generation in the schools of the country, by teaching, not Latin and Greek and Hebrew, and old speeches of old Roman senators and Pagan generals, but the principles of mechanical philosophy, civil engineering, road making and bridge building, geology, agricultural chemistry, and animal and vegetable physiology; in short, very nearly the same education which is now conferred at West Point, and which is paid for by the farmer and planter, who it seems dare not even ask for similar appropriations for instruction for their own sons in the arts of production. It is to this reform in the schools that must now be sown the only seeds that will bear good fruit for agriculture, and that reform will never take place in a state of things under which men are scattering in pursuit of bread, instead of finding bread by the diversification and prosperity of all other pursuits in proximity with the plough and the harrow. When a state of things exists, under the force of which rural population thickens, then will agriculture improve, as other arts are doing. Then shall we have inventions to do for it, what the cotton-gin and the power-loom have done for manufactures; but never while we forbear the use of the natural resources with which God in his bounty has imbedded and filled our country. But on this point we have more fully expressed our views in the discourse pronounced at the instance of the farmers of Bucks County, in the only form that we could hope to justify the honour of being invited to address them on the interests of their pursuits.

EXTRACTS FROM MR. INGERSOLL'S ADDRESS.

On the Progress of Agricultural Improvement.—There is as much difference between the irregular efforts of undisciplined farming, and the due appliance of skill under the guidance of knowledge, as between the wigwam of the savage and the convenient edifice of improved society. Agriculture, as an art, is little known to the children of the forest. In the progress of society, mechanism, in its various shapes, is apt to keep in advance of it. When land becomes valuable with increased population, or adjacent markets furnish new demands for more abundant supplies, additional means are sought for fertility and productiveness, and agriculture takes again a prominent place as an attractive pursuit.*

Agricultural Education.—One of the most enlightened proofs of the advancement of the age—the system of public education, is well adapted to the advancement of agriculture. Primary schools, which are no where better conducted than among ourselves, and especially that High School which is a climax of education for the people, and a nursery for expanding science and philosophy, present opportunities which should be embraced with avidity. Where could the elements of farming be taught with so much propriety? Elements that would be any thing but thrown away upon those who may not pass their lives upon a farm, and would be a treasure to those who are so designed. Knowledge so important and so well calculated for everyday use, so diversified and so practical—is an acquisition desirable for all classes: to some it is invaluable. A professor having this object especially in view, would occupy his chair and dispense his instructions to a purpose as beneficial as any that in the wide range of provisional education has been wisely contemplated. All the natural sciences, call them by what name you will, are hand-maids to agriculture. The only peculiarity it claims is in the application of them. In the particular object and use they would have less immediately to do with the physiology of man, his diseases and desires, and more with the physiology of agents destined for the use of man—the earth and its properties—plants and their tendencies—domestic animals and the means by which they may be rendered most available. So large a part of the population of Pennsylvania is engaged in agriculture—so great a share of her thirty millions of broad acres, after deducting the vast area of mineral wealth and forest, consists of arable, pasture, and meadow ground—that it will be no unreasonable exaction to expect full information from the fountain-head on these vital topics. Husbandry may justly claim a chief share of the care of statesmen in such a region, and that care can be most effectually applied through the agency of an institution, which, owing its condition to the foresight and liberality of statesmen, is entitled to be their pride.

Recommends a valuable School Book.—A valuable little work very lately given to the public by Mr. F. G. Skinner, owes its origin in France to the Professor of Rural Economy and a Director of the Normal Primary School of the Department of Meurthe, both honorary members of the Central Agricultural Society of Nancy. These "Elements of Agriculture," besides their usefulness in conveying information on the subject of which they treat, impart a happy suggestion as to the source and character of the attention paid to the art itself abroad. They are a happy confirmation of the sort of contribution to knowledge in the culture of the soil which is now respectfully and earnestly urged. *Is it not remarkable that no provision whatever is made either in rural or town districts, in primary, secondary, or high schools, sustained as they are entirely by the people of the Commonwealth, and in due proportion by the country people of the Commonwealth, for this object, so essential to the best interests of all?*

The little work here recommended, which may be had for a few cents, was very highly recommended lately in his inaugural address, by the distinguished president of the Norfolk County, Massachusetts, Agricultural Society. It is impossible for any one who reads it not to concur in the opinion that every country school-boy ought to have a copy. A gentleman in Virginia lately wrote for one hundred. Mr. Allston, of South Carolina, at the head of the educational institutions there, was the first to order a number for gratuitous distribution.

* This can only ensue when all the other industrial pursuits for which a country possesses the materials, are judiciously and carefully fostered by a wise policy to protect labour against the miserable and degraded labourers of other countries.

STATE AND COUNTY FAIR AT NEW CASTLE.

AT NEW CASTLE on the 17th, we had the pleasure to attend the united exhibition of the County and of the State. We have only room to say in a few words, that it was a good show of animals, vegetables, and butter—generally good, and some excellent of their kind; but the best of the show, was the *show of men*. Never have we seen a larger proportion of well-dressed, good looking, well behaved, respectable men on any public field. They showed in their very looks, walk, and general appearance, an air of conscious prosperity; a sort of sleek, thriving condition, such as you see cattle put on when they prove by their coat and handling that they are waxing fat. There is no State where improvement is more steadily advancing than in Delaware. They understand a few things, and among others these,—the importance of draining their land, the indispensable necessity for restoring its exhaustion by manure—not omitting *lime* and guano—*maugre* the opinion of the “American Institute” against all these three means of improvement. Further, the Delaware farmer understands, or, if not, he ought to be told that another important point is to extirpate *weeds*, that they may not devour the food intended for his grain and grass, as geese sometimes steal the corn that, in our boyish days, we have often seen poured out in cars on the grass to the riding-horse in ——— county in Maryland. Moreover, the Delaware farmer understands that to get the most out of his land, it must be ploughed deep and put in good tilth—and, after all, these are the great, the cardinal points in good husbandry. We shall have more to say of this fair, as we may make of it a hook or peg on which to hang some reflections that occur to us on all such occasions,—on the aptness of those who manage them, and of farmers generally, to overlook the vastly superior merits of inventors of labour-saving implements and machinery over the breeders and fatteners of fat cattle and hogs.

GOOD COWS.

“THE cows which received the premiums of the Essex County (Mass.) Agricultural Society, last year, gave the following products: The one which took the first premium was six years old—‘of mixed breed;’ from 3d June to 3d July she gave an average of 18 quarts of milk per day, beer measure, which yielded 10 pounds of butter per week. Her feed ‘common pasture only.’ The one which took the second premium gave, from April 28th to September 28th, 2405 quarts of milk. The one which took the third premium was eight years old, a cross of the Durham breed. She gave, from the 27th May to the 25th June, an average of 15½ quarts per day, which yielded a little over 2 pounds of butter per day—weighed after it had been twice thoroughly worked. In 121 days, her milk gave 192 pounds of butter. Her feed was ‘good pasture,’ with 15 quarts of meal during the trial of 30 days. The one which took the fourth premium, was nine years old, and gave, in one year, 8767 pounds of milk—probably about 4383 quarts—or an average of about 12 quarts per day. The one which took the fifth premium, was eight years old, and afforded 15 pounds of butter in a week, in July last. Her feed ‘common pasture,’ and one quart of meal per day. The one which took the sixth premium, gave 2448 quarts of milk from April 25th to September 26th.”

Whatever may have been the *breed* of these cows, we would wager a trifle that they bore the marks or “escutcheons” laid down in Guenon’s *Cow Book*! At the late fair in Baltimore, with that guide, we had no hesitation in predicting the cow that would, and

that did take the first prize. She proved to be an Ayrshire imported by Mr. McHenry, of Hartford county. It is in satisfactory proof that a man in France has lately very nearly doubled the produce of his *cheese dairy* of twenty-five cows in five years, by attending to supply the deficiencies in his herd, as they occurred from time to time, according to these marks in the Cow Book. Mr. McHenry, who has attended to the subject, says he turns out no calf for the dairy but in reference and conformity to the directions there laid down.

SHEEP AND WOOL.

"A Profitable Sheep.—Seymour Aldrich, a farmer in the town of Hopewell, in this county, on the 8th inst., sheared twelve pounds of clean, fine wool from a Paular Merino Buck. The wool had a growth of less than one year, the sheep having been sheared the 25th of June last. Who can beat this?—*Ontario Repository*.

"We think Mr. John D. Patterson, of this village, can beat it, for we saw the fleeces of his pair of imported Merino yearling sheep weighed, and the result was as follows:—

"The buck's fleece weighed 14½ lbs., and the ewe's weighed 10 lbs. 10 oz. of very clean, fine wool.

"Mr. Patterson informs us that the sheep were well covered with soap, and then *thoroughly* washed in a stream of clear running water, and sheared as soon as their wool was dry. Notwithstanding these were remarkably heavy fleeces, they were pronounced by several wool-dealers present to be unusually clean, and almost entirely free from gum or oily matter. We kept some samples from each fleece, which we shall be happy to show to all who are disposed to examine them. These sheep are of enormous size, were bred in France, and are known as the celebrated Taintor sheep, having been imported when lambs, by John A. Taintor, Esq., of Hartford, Connecticut, of whom they were purchased by Mr. Patterson, at a great price."

The Editor of "The Westfield Messenger," Chautauque county, N. Y., has been good enough to send us samples of the above fleeces, which may be seen at the office of "The Plough, the Loom, and the Anvil." We remember to have seen, under the auspices of our friend Mr. Buck, some of Mr. Taintor's importation, soon after their arrival at Hartford. However others may have failed, we are inclined to think that Mr. Taintor has reached the head-springs of the Nile: that is, that in his researches after fine-woolled sheep in Europe, he left none behind superior to what he brought.

The Editor of "The Messenger" seems to overlook the fact that Mr. Patterson's yearling sheep were probably fourteen or fifteen months old, whereas the fleece of Mr. Aldrich's had a growth of "less than one year."

There has been undoubtedly a great increase in the weight of fleeces. We find in that unequalled work by Randall, on Sheep Husbandry in all its branches, that Mr. Lasteyrie gives the following annual averages per head of the Rambouillet flock—1796, 6 lbs. 9 oz.; 1798, 8 lbs.; 1799, 8 lbs.; 1800, 8 lbs.; 1801, 9 lbs. 1 oz. This, says Mr. Randall, is unwashed wool, and will lose half in washing.

We have just referred to Mr. Randall an inquirer from South Carolina for a ram and six ewes: being assured that if supplied by or through him, all will be "O. K."

Rape Cake.—In the recent number of the "English Agricultural Journal," Mr. Pusey gives the following result of an analysis by Mr. Way:—

		Per Centage of Nitrogen and Fat.	
Linseed cake	. . . . .	4.6	11.9
Rape cake	. . . . .	5.23	11.6

which is to the advantage of the latter. We have seen no analysis of the ashes of the rape seed.

AN ACCOUNT OF TWO EXPERIMENTS WITH GUANO AND OTHER MANURES, IN STOVER PARK, DEVON.

No. 1.—Report of an experiment to test the comparative efficiency of five different kinds of artificial manure in improving pond-mud, the experiment being made on an acre of inferior pasture land in Stover Park, in the years 1847-'48-'49.

The land on which the experiment was conducted is of uniform quality, the soil being a light sandy loam a few inches in depth, incumbent on a stratum of white clay.

The land underwent thorough draining in 1844, prior to which it would not produce a rent of more than 5s. an acre.

No manures were applied to the land in 1848 or 1849.

The object sought to be attained by extending the experiment over a period of three years was to test the *durability* of the different manures.

Manures applied in 1847.	Weight of hay cut in 1847. lbs.	Weight of hay cut in 1848. lbs.	Weight of hay cut in 1849. lbs.	Weight cut per acre in 1847. Seams of 3 cwt.	Weight cut per acre in 1848. Seams of 3 cwt.	Weight cut per acre in 1849. Seams of 3 cwt.
1. Six cubic yards of mud mixed with six cwt. of salt, (cost of manure 14s.) . . .	312	327	613	4 $\frac{3}{4}$	4 $\frac{3}{4}$	9
2. Six cubic yards of mud mixed with 1 $\frac{1}{2}$ hogshead of lime, (cost 13s. 6d.) . . .	353	337	538	5 $\frac{1}{4}$	5	8
3. Six cubic yards of mud mixed with 3 bushels of bone-dust, (cost 14s. 3d.) . . .	511	419	670	7 $\frac{1}{2}$	6 $\frac{1}{4}$	10
4. Three cubic yards of mud mixed with 3 cubic yards of tan-yard refuse, (cost 14s.) . . .	524	354	558	7 $\frac{3}{4}$	5 $\frac{1}{4}$	8 $\frac{1}{2}$
5. Six cubic yards of mud mixed with 90 pounds of Peruvian guano, (cost 14s.) . . .	900	550	725	13 $\frac{3}{4}$	8	10 $\frac{3}{4}$

N. B.—The after-grass in 1847 was stocked with sheep, but in 1848 it was left unconsumed.

No. 2.—Report of an experiment made with the undermentioned manures on an acre of pasture land in Stover Park, in the year 1849.

The manures, when mixed with a small quantity of fine earth, were applied broadcast on March 29, and during the rainy weather which prevailed at the time.

The land is of a fair average quality, and was formerly used as tillage land, but has been in pasture for many years.

The crops were mowed on 22d June, and the herbage produced by the different manures was of a superior quality.

Manures applied.	Quantity of manures applied. cwt.	Quantity applied per acre. cwt.	Weight of hay cut. lbs.	Weight cut per acre. Seams of 3 cwt.	Cost of the manures. £ s.	Cost of the manures per acre. £ s.
1. None . . . . .	.	.	401	4 $\frac{3}{4}$	.	.
2. Superphosphate of lime	2 $\frac{1}{2}$	9	616	7 $\frac{3}{4}$	0 18	3 12
3. Nitrate of soda	1	4	706	8 $\frac{3}{4}$	0 18	3 12
4. Peruvian guano	1 $\frac{1}{2}$	6	1210	14 $\frac{3}{4}$	0 18	3 12

E. S. BEARNE.*

VIRGINIA.

"*Lead in Albemarle.*—We yesterday saw a very rich specimen of lead found on the lands of Mr. Wm. Faber, about half a mile from the Nelson line and nine miles from the canal. There are two veins discovered—one of them about four feet thick and very rich in metal. Mr. F. is now exploring the mine, which promises to be rich and abundant. The lead was discovered about twelve months since—and is about one mile from Thurmond's rich gold mine, recently brought into notice. The specimen of lead before us is pronounced by Professor Rogers to contain eighty per cent. of lead and four per cent. of silver."

There is no portion of the Southern States that is not rich in mineral wealth, but that it shall become available population is necessary. Virginia has iron ore in abundance, and lead ore in abundance, and gold and silver ore in abundance, and she abounds in the fuel requisite to convert these ores into the form to fit them for the use of man, yet her people are flying from her exhausted lands, to seek in the West new lands to be again exhausted, instead of concentrating themselves upon the rich soils at home. Of all portions of this Union, there is not one that possesses advantages exceeding those of that State, and yet it relatively declines daily in wealth and influence, as every Virginian knows. Let her but determine to adopt the policy that tends to enable the plough, the loom, and the anvil to come together, furnishing employment for the tens, if not hundreds of thousands of people, men and women, boys and girls, now unemployed, and she will speedily regain that position to which her beautiful situation and the immense extent of her mineral wealth so eminently entitle her—and as speedily lose that unenviable position which she occupies—that of furnishing more office-hunters than any other State of the Union. When the plough, the loom, and the anvil come together, labour becomes profitable, and private employments become preferable to public ones. Virginia furnishes, we believe, thrice as many office-seekers as all New England.

ON THE PRINCIPLES TO BE OBSERVED IN THE ERECTION AND CONSTRUCTION OF FARM-HOUSES.

THE OUTHOUSES OF A FARM are those buildings in which the farmer stores and prepares his crops, rears and feeds his live stock, and houses his working cattle and implements. On their arrangement in regard to each other, as well as on the adaptation of each to its separate purpose, much of the farmer's profit necessarily depends. It is to the first of these considerations, the disposition of the several parts in relation to each other, that we shall now direct our attention.

The leading object to be aimed at in the arrangement of the outhouses of a farm is economy of time and labour in the performance of those operations which are to take place within them. The first principle by which we must be guided in an endeavour to effect this object is, the self-evident one, that there must be an immediate connection between those buildings in a homestead whose usefulness depends upon each other. In carrying out this principle, we shall find that the position of the barn governs, in a great degree, that of the other buildings; for the straw-barn being the great storehouse of forage and litter, from which the stables, feeding-houses and sheds and yards receive

their supply, it is necessary that these be situated as near to it as possible, and those nearest to which the greatest and most frequent supplies have to be conveyed. Again, the straw-house is an appendage to the barn where the corn is threshed—there is a necessary connection here also. To the corn-barn, also, must be attached the building which contains the motive power to drive its machinery; and it is a convenient arrangement to have the granary, too, in immediate connection with the corn and dressing-barns. Farther, the house where food is consumed should be in connection with, or at least not far removed from, the house in which it is prepared, and this again should be contiguous to the places where the food is stored. Lastly, that the cleaning out of the houses may not consume unnecessary time, the place where the manure is deposited should be near to them, and of ready access.

It should always be borne in mind that it is more important to save time in comparatively insignificant operations, of frequent occurrence, than in large matters which are not often repeated. Thus, if the separation must be made, it is better to let the house be where

food is prepared, and whence small quantities are taken several times each day, close to the place where food is consumed, than to have it near the storehouse, from which the supply requires to be carried only once.

The second principle of arrangement which should guide us, although subordinate, is yet of great importance; it is to classify and arrange together the buildings used for like purposes.—An attention to this greatly facilitates the labors of the homestead. Thus, the houses and yards for particular descriptions of stock should be placed together; the working cattle should be kept by themselves; the cows of the domestic dairy should be kept apart from the feeding-stock; the pigs and the poultry should have their proper locality. It is of great assistance to this classified arrangement to have a working-court or yard, round which are assembled, in their proper places, the apartments for storing and preparing food, the sheds where the wheel-carriages of the farm are stored, the houses where the tools and smaller implements are kept, those in which the blacksmith and the carpenter work, and the others used occasionally for various purposes. And, in addition to this, it is important to place the highest buildings so as to afford shelter from the prevailing winds, and yet not to intercept the rays of the sun from the other buildings and the yards. In many situations it is desirable that the whole of the out-houses should be so arranged as to have one common entrance, which can be closed for security every night. This is especially necessary near towns.

It may be proper to remark that all the roads should be wide enough to allow a cart and horse to be turned on them; and that it is well that the yards should be so arranged as to allow of a cart being driven through them, which is much better than backing the horse.

So far, then, for the principles of arrangement of the buildings relative to each other. The next topic which demands our attention is the form which the collected buildings should assume, and this involves the consideration of aspect.

Under the idea of compactness, out-houses used generally to be arranged in the form of a square, with a central yard into which the litter was thrown; and here, unchecked by a ray of sunshine, wading in a pool of rain-water from the roofs of the buildings, and of liquid manure from the houses, the farming stock was suffered to languish. Professor Low, of Edinburgh, first showed the absurdity of this system, and pointed out the advantages to be derived by the stock from the admission of sunshine and air to their yards. He showed that these benefits could be best obtained by the form which also ensured other advantages—a long parallelogram. The Professor's principles of arrangement have been extensively adopted in modern homesteads, and have been advocated in almost every publication on Agricultural matters, although very seldom with the acknowledgment of the source whence they were derived.

The best form that the farm outhouses can assume—that which combines the greatest advantages—is a long parallelogram, with its diagonal nearly on a line from North to South. The prevailing and severest winds being from the West and West by North, the greatest possible amount of sunshine, and the best shelter may be obtained by having the sheds for the cattle and their yards open to the South and

East. There are cases, however, in which this rule will not obtain, and these must be dealt with according to circumstances.

The buildings should be placed, if possible, on a gentle rising surface. If, where water-power exists, such a situation can be found, it is well to take advantage of it. But if to secure such power it is necessary to place the buildings where light, warmth, ventilation and drainage cannot be obtained in perfection, then the water-power ought to be sacrificed to these more important benefits. The position of the homestead is often determined by existing roads and divisions of the farm, irrespective of the eligibility of the situation in itself. This is an absurd practice, and cannot be too severely reprehended.

Among other matters demanding our attention in this preliminary notice, are the means for preserving the liquid manure made in the steading. The attainment of this important point is greatly assisted by the classification of the buildings before spoken of. Underground drains should be carried from the cow-houses, feeding-houses, and pig-sties, to one or more tanks. The tanks may be of two kinds; they may be adapted for making compost, in which case they should be in the form of a rectangular basin sloping inwards from the ends to its deepest point in the centre of its length, so that a cart may be driven through when the compost is carried out; and this, or something similar to it, is probably the most economical mode of using the liquid manure on a farm. Or the tanks may be in the form of a well, square, rectangular, or circular in the horizontal section, and arched or domed over. In this case the tank is used to contain the manure in its liquid state, and should, by puddling and the use of cement, be made perfectly water-tight. It must have a man-hole in the arch or dome, and another opening by which a pump may be inserted, or in which it may be permanently fixed. The drains, before entering this latter kind of tank, should terminate in a cesspool in which the liquid manure may deposit any sedimentary matter which would obstruct the working of the pump if deposited in the tank.

The eaves of all the buildings should be furnished with gutters, and the rain-water collected by them conveyed to underground drains by cast-iron pipes. The drainage of the site has already been spoken of as an essential requisite. It should be thoroughly done. In too many instances remedies are applied to the foundations of buildings, to prevent dampness from ascending, while the only true remedy is, by draining thoroughly, to remove the cause.—As drains very often harbor vermin, cesspools should be constructed in them, at proper places, without the buildings, which will effectually bar their progress.

On reviewing the principles here recommended to be observed in the collocation of the out-houses of a farm, it will be seen that their application in practice must be attended with no little difficulty. Slight variations in management, to suit the soil, and other peculiarities of the farm; the nature of the power to be employed in threshing, &c.; the requisite arrangements for shelter in exposed situations, when such situations cannot be avoided; and the nature of the ground on the site of the buildings, all tend to embarrass and prevent the application, in any single case, of all these principles in their integrity. The judicious designer knows

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in such cases what to forego, and and what to secure; and endeavors, when a sacrifice has to be made, so to arrange, that all the more important principles may be observed and carried out.

Before concluding these remarks, it may not be amiss, in a sentence or two, to consider the *appearance* of out-houses, arranged on the principles here advocated. Premising, then, that we consider any attempt to mask or disguise the character of a building, as indicative of what, in ordinary language, is called bad taste; and that the expression of character and fitness, on the contrary, is in correct taste, we shall find

that this expression of character and fitness in these buildings, can easily be obtained; in many cases the whole steading can be arranged symmetrically; and where this is not attainable, the extended lines of building, the archways, the varying outline caused by the different heights of the houses, and the numerous gables, harmonizing with that of the stacks in the barn-yard, never fail to give piquancy and picturesqueness. There ought to be no mock windows, mock doors, or arches; no false gables; let every thing be real, and expressive of its use; and trust to that expression, as the best æsthetic principle of design in such erections.

ON AN IMPROVEMENT IN THE MODE OF ATTACHING HORSES TO WAGONS.

BY J. H. GRIEVE.

HAVING observed amongst the topics proposed by the Society as subjects for prize essays, that of the use of one-horse carts, I thought it might be agreeable to you to receive some remarks relative to different modes of traction which have been suggested to me by actual observation, and which, so far as my knowledge extends, have as yet passed almost without notice.

There is no mechanical reason why a single-horse cart should possess any advantage over a four-wheeled wagon; and if that opinion has gained ground in this country, it is wholly to be attributed to the defective manner of application of horse-power.

In one-horse carts, a part of the load weighs upon the saddle placed behind the shoulders of the horse; and, as the principal fulcrum upon which he acts is concentrated in his hind-feet, it may, at first sight, appear that the load upon the back would assist in the effort of traction, and I have no doubt that it does so to a certain degree; but this small advantage is only gained at the expense of the muscular power of the animal, and has a natural tendency to exhaust and fatigue him.

If the use of wagons has hitherto proved unsatisfactory, the cause is merely that no sufficient care has been taken to ensure the *simultaneous* effort of the horses, so that a great part of their power becomes inefficient.

Nothing, indeed, can be more opposed to reason and good sense than the manner of yoking several horses in tandem that is usually practised both for carts and wagons, particularly in the south of England.

In the first place the shafts are often too much elevated, and then the shaft-horse is borne to the ground by the efforts of those that precede him, or he is made to swerve from side to side by the alternate jolting of the wheels, or by the leaders varying from the straight line of traction.

In the case of four-wheeled wagons, with horses yoked abreast, the traces of each horse are always fixed to the splinter-bar; it is more than difficult for the driver to ascertain if all his

horses are exerting their strength together, and it is almost impossible for him, even with the utmost care, to force them to do so.

A much better method of yoking has been applied for ages past to the plow, viz. that of the swing-bar; but, strange to say, this system has not been adopted for carriages, with the exception of the leaders of stage-coaches; and this only proves that convenience, or, we may say, necessity, has been the primary cause of its being adopted at all, and not any sense of the superior mechanical arrangement of the system.

A little reflection will, however, show that this arrangement is better adapted than any other to produce simultaneous action—each horse being so placed respectively to his neighbor as to operate on a balance-beam; and it is self-evident that neither can draw unless the other acts as a counterpoise: the result is that the full and united force of the team is obtained for the purposes of traction.

For centuries past this system has been successfully applied in Belgium to the yoking of horses to four-wheeled wagons; and I could cite various instances of great loads conveyed in that manner, but will only mention a single instance of a load of goods which I myself saw weighed, and which was brought from Antwerp to the neighborhood of Mons, a distance of about 72 miles. The wagon was a very heavy one, with the wheel-tires 8 inches in breadth, and was drawn by five horses, and the load weighed fully 14 tons. Now when we take into consideration that several considerable acclivities had to be surmounted, at only two of which spare horses had been used, this example alone is sufficient to demonstrate the evident superiority of this system of traction. Doubtless the paved roads offer less friction than our usual macadamized ones, but this advantage will not account for the marked superiority of this load, which amounts, including the weight of the wagon, to about 3½ tons per horse.

I may observe that in Belgium the load is strictly limited, by law, in proportion to the breadth of the tires, and that a greater load than

that above cited could not be conveyed during fresh weather; but instances have occurred of much heavier weights being drawn by the same number of horses, during hard frosts, when no injury can be done to the roads.

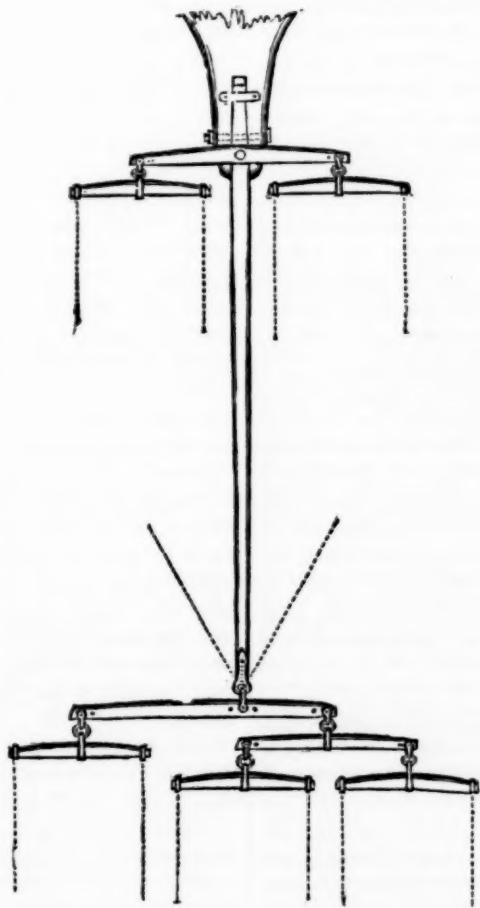
The horses usually employed on the road are of the old Flanders breed, the same as the common dray-horse in London, but evidently inferior to them in strength and weight.

Wagons of the same nature, but of a lighter construction, are also generally employed for farm purposes, and are found convenient and effective.

The Belgian Government have applied the

same principle to the yoking of the artillery-trains; and it is certain that no guns of the same weight, and drawn by the same number of horses, would otherwise be able to traverse rough and uneven ground with the same facility.

It may be remarked that provision is made to adjust the leverage to the power of each horse, so that the pairs may be always equally matched, if not in strength, at least in their effective efforts. To explain this more clearly, I have subjoined a diagram representing the fore-train of a wagon adapted for five horses. It will be observed that spare holes are provided in the swing-bars to change the leverage.



N. B. It is curious, but nevertheless the case, that the whole team of five horses is guided by a single small line tied to the middle of the bridle-reins of the off-hand leader.

3 King's Road, May 12, 1845.

[*Jour. of Royal Ag. Soc. of England.*]

GRAFTING.—It is often, in grafting upon slender stocks and branches, very inconvenient to attach and support a great lump of clay, which, in spite of the greatest care and attention, will, either in very wet or very dry weather, crack and fall away. Last Spring I made trial of sheet India-rubber, cut into narrow strips or bandages, from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch broad, which I applied to the graft—having first fixed the graft with bast—and with success. The India-rubber presents all the requisites sought for in

clay; it is air-tight, and water-tight, and, moreover, it will not fall away; and it is elastic, which admits of the swelling of the scion in its growth, and it is applied with perfect ease and quickness. After wrapping the bandage round the graft and stock, as you would a linen bandage on a cut finger, the last turn only requires securing by tying with a bit of thread or thin bass; and it has a very light and neat appearance, when the operation is completed.

G. L.

ON FATTENING CATTLE, AND THE FORMATION OF FARMERS' CLUBS.

CAN we too often urge the formation, in every Election District of the country, of *Farmers' Clubs*, for the discussion of questions of all sorts, even political questions, *immediately and obviously connected with the spread of agricultural knowledge*, and the advancement of agricultural prosperity? How easy it has ever been found when the political huckster has desired to get up an excitement, most generally with some sinister design covered by the avowal of a public purpose, to bring his clansmen around him, at some X roads tavern, to be slang-whanged. For *this* purpose, he has but to sound his whistle; alas, not the spirit-stirring whistle of *Rhoderick Dhu*—at sound of which

"The rushes and the willow wand
Are bristling into ax and brand,
And every tuft of brand gives life
To plaided warrior, arm'd for strife."

No! no! his resembles rather the insidious call of the shepherd, whose flock, gathering around him in hope of being fed, are flattered into the fold and sheared, and then turned loose again until another crop of wool has time to grow and be sheared again. Thus are good, easy Farmers gathered under the banner of party to appoint their *patriot leader* to the Legislature or to Congress, or to recommend him to some Executive office, and all this in abject compliance with the "*usages of the party*."

We are characterizing no particular faction, but, more in sorrow than in anger, adverting to the easy excitability of the agricultural community, in matters of party politics, and the great difficulty of bringing them together for any *peculiar concern of their own*, as *Farmers*, and the extreme reluctance and parsimony with which they can bring themselves to give either time or money for the discussion of agricultural questions, the dissemination of agricultural knowledge, and for devising the ways and means of controlling and shaping the legislation of the State and the Country, for the protection and benefit of the *landed interest*. We have known farmers and planters who would cheerfully give a fat sheep or bullock, or a barrel of whisky or of flour, for a *partisan "treat,"* who would not give \$5 a year for 1200 pages of the most valuable information to be gathered in reference to their own business, from the experience and teachings of the best farmers, and the ablest men to be found, in all parts of the world! And yet there are men who will tell

you that they wish their sons to be honorably distinguished for intelligence, and to keep pace, themselves, with the progress, experience and discovery, in every thing connected with their own business and sphere in life!

We know not how we could give a better idea of the utility of these Farmers' Clubs, and of the useful designs which animate and so well become them; than by copying, from the last November number of the *London Monthly Magazine*, the following account of a meeting of the "LOUGHBOROUGH AGRICULTURAL ASSOCIATION." The problem for discussion was *The Fattening of Cattle*. We transfer to our columns the observations of the several speakers, the more readily, as they seem to answer, in part at least, an inquiry lately made of us by MAJOR GWINN, the enterprising contractor for the completion of the Chesapeake and Ohio Canal, who has large possessions in the fine "glades" of Allegany County, Maryland; a region so admirably adapted to the growth of *oats and potatoes*, and replete with advantages for grazing and for sheep and dairy husbandry more eminent and less known than almost any equally eligible portion of our country. Major Gwinn's inquiries were, as to the adaptation of the crops congenial to that elevated region, to the *Fattening of Cattle and Sheep*.

True, it may be said, and by some objected, that these are *English* discussions; but the substances referred to, and the principles evolved, are of no particular nation or clime; they are of universal use and application, and in Heaven's name let us go, for knowledge, to Kamschatka or the moon, if not elsewhere to be had.

It requires but half a dozen in any county or neighborhood to form the nucleus of such a club. If the right spirit exists, it will soon be sufficiently numerous, and if it does not exist, it may be easily infused.

One thing is to be guarded against—the *cacothyes loquendi*. Too great a disposition to twaddle and to have the last word! When questions are given out, the chairman should allow no rambling from the subject in hand. One thing at a time—and for the sake of uniformity and consistency in the manner of conducting these meetings, it would be better to have a standing permanent chairman, chosen with strict reference to *his tact for the duty*,—quali-

fied by a happy union of courtesy and firmness, to maintain order, and bring back rambling debaters to the order of the day. There is nothing useful gained by picking up, at random, this gentleman or that, strangers, who happen to come in, and making them chairmen, merely for the sake of making a hit, or a sensation in the papers. But to return.

One fact alone, repeatedly stated, and universally acquiesced in, at this Loughborough meeting, would repay the time taken up in the perusal of its proceedings, if, happily, it should prompt the reading farmer, to act upon the testimony we there find, again, in favor of *protecting domestic animals from too much exposure to cold*. It is broadly asserted that the warmer they are kept, the less food they require to keep them in a certain condition. It is there shown, also, that food for fattening animals, goes farther when given of a temperature near the natural temperature of their own bodies, which is nearly 100 degrees. Here, too, we see it stated as an established fact that the *exclusion of light* favors the fattening process. All these things are essential, not only as matters of information with which every accomplished farmer should be acquainted, but as matters of practical economy in the management of his estate.—We will suppose too, for example, to carry this matter a little farther, that a gentleman farmer near Washington, is dining, we will say, with the President or the Mayor of the City, in company with his Excellency the Minister from Holland, whom we happen to know to be of enlightened, inquisitive mind, as all Ministers should be, and the question were to come up about *cheese*—(which it must be allowed would be a very natural one about the time the Port makes its appearance,) though this gentleman farmer might not choose to boast over the Dutch Minister, that ours had driven *his country cheese* out of the English Market; yet the fact that it has done so being admitted, would it not be legitimate that the American farmer, proud of his calling, should take pride in the fact being so, and in being able to answer the question *why?* which is disclosed in this *English* discussion! Are not the substance of these proceedings, and the prize essay we have before published on the manufacture of Cheshire cheese, among the sorts of knowledge that every farmer, anxious for the intellectual culture of his son, would like him to possess—even as much, if not more, than to possess it himself? He that would not, cannot have the heart of a man, much less of a *parent*. Yet how is knowledge—that sort of knowledge which should not only be a part, but is fitted to be the most delightful part of rural life—to be obtained but by *inquiry*, by *reading*, and by association with companions and men, more informed than ourselves—a

thing which every young man should study to do?

It is to beget and to satisfy this thirst for knowledge, and for that true glory which knowledge and virtue only can confer, that we are devoting all our poor abilities to the "FARMERS' LIBRARY AND MONTHLY JOURNAL OF AGRICULTURE;" and as we hope for success, we would so devote, if we could afford it, a portion of all of life that remains, without any remuneration but the pleasurable consciousness of having contributed something toward the moral and intellectual improvement of a pursuit, which in more senses than one has always *supported*, for it has always been *ridden* by, every other.

Loughborough Agricultural Association.

THE quarterly meeting of this Association was held in the Wellington room, at the Plow Inn, on Thursday, the 25th September. S. B. Wilde, Esq. presided; and Mr. J. N. H. Burrows occupied the vice-chair. After the cloth had been drawn, and the usual loyal toasts were given, as also the health of the President, Chas. Wm. Packe, Esq. M. P.—

The CHAIRMAN read the circular calling the meeting, in which it was announced that the subject of discussion was, "the fattening of cattle."

Mr. RAWSON, surgeon, of Kegworth, introduced the subject. He said, there were known to chemists about fifty-six elements, of which there were only eight or nine in animals; the principal of these were oxygen, hydrogen, nitrogen, and carbon. Oxygen enters into all animal and vegetable substances, and is an essential ingredient in atmospheric air. Nitrogen has no positive properties; its object is to dilute oxygen. No animal could live in nitrogen alone. Hydrogen is sixteen times lighter than common air, and is an essential ingredient in water, and very inflammable. After an elaborate description of the various elements which enter into the animal frame, the speaker proceeded to inform the meeting what were the various uses of each. Nitrogen, he said, was the principal ingredient in flesh and muscle. Fat is composed of carbon and hydrogen. If they wished to make an animal fat for sale, or for show, they must feed it on carbonaceous food. Unripe straw is very carbonaceous. As the feed ripens it becomes less so, and not so suitable for fattening. Cows generally feed well on aftermath. Half a pound of Swede turnips contains 110 grains of nutriment, while the same weight of white turnips only contains 85 grains. The outer temperature is very important; it should be brought as nearly as possible to the temperature of the blood. The same regard to temperature is necessary with respect to a milking cow. Fat is a mere deposit, a secretion; it does not impart strength, rather the contrary. Hence we do not make a horse fat for racing, but make him display muscular power. In fattening horses for sale, carbonaceous food, young grass, oil-cake, Swede turnips, &c. should be given. In feeding for use, the carbonaceous should be mixed with an equal quantity of other kind of food.

The CHAIRMAN next proposed "The health of Mr. Bernays," which was received with applause.

Mr. A. J. BERNAYS (analytical chemist, from

Derby), then rose and said: Agriculture is a subject of such vital importance to the community at large, that I consider myself bound to attend all such meetings, where I may increase my knowledge of it; and I shall always be glad to be present at your quarterly meetings as long as I am in the neighborhood of Loughborough. We have just now heard that although 56 elements are at present known, yet only a small portion of them enter into the composition of animal and vegetable life. Of this portion, consisting of from 10 to 12, only four enter extensively into the formation of the organized portion of the vegetable and the animal. These elements arrange themselves into two distinct classes: the one class, formed by the combination of carbon, hydrogen and oxygen, in different proportions, includes what Liebig calls *the elements of respiration*. Hereto belong starch, fat, butter, sugar, gum, and alcoholic fluids. These may likewise be termed non-nitrogenized substances. The other class, formed by the combination of all the four elements, includes *the elements of nutrition*, or the *nitrogenized constituents of food*. Hereto belong vegetable and animal fibrine, caseine, albumen, and gluten. The non-nitrogenized constituents were provided for sustaining the animal heat of the body, and protecting its parts; and in so doing a provision is laid by, upon which Nature draws when the body is diseased. From their very nature they are easily destroyed by the influence of the oxygen of the air. You all know it to be a common practice to milk cows in the field, if they be at any distance from the homestead; the reason is obvious: when a cow walks a great distance without food, the oxygen of the air almost immediately begins to act upon those substances with which it can most easily combine. Such a substance is the butter in the milk: when a cow is driven home, the butter is found, in great part, to have disappeared. Again, after parturition, the milk of the cow contains only traces of butter; because, by the increased action of the muscles, a larger proportion of oxygen is taken into the system. This well known fact brings us to the subject of stall-feeding. When a cow is intended for milking, and with a view of yielding as much butter as possible, we naturally confine her. In this unnatural state, there being no call for exercise, the food taken by the animal is only in small part expended in maintaining its heat. However, we all know that confined milch cows never yielded so well-flavored butter or cheese as those which are unconfined. Cows living in a natural state eat what they like; stall-fed cows eat what they get. *Owing to this cause, the Dutch cheeses have nearly been driven out of our market by the American.* In Holland, stall-feeding is the common practice; hence is the produce less palatable than the American, in which country, land being cheaper, the practice is unnecessary. There can be no question about the utility of stall-feeding, but I very much question whether close confinement is equally beneficial with a confinement allowing of some gentle exercise. When the weather is warm, cattle may pasture in the meadows without loss to the agriculturist. *The air is then nearer the temperature of their own bodies, besides being more expanded.* The animals feel no call for exertion to keep themselves warm, and the gentle motion necessary in the seeking of food, by increasing the healthy state of the body, enables them not only to eat more, but to

assimilate better what they do eat. In winter the case is materially altered. The temperature is far lower than that of their own bodies; the air, too, being more condensed, contains a proportionally larger quantity of oxygen. Therefore, more non-nitrogenized food will be required to combine with the excess of oxygen; indeed, as we all well know, more food will be required than in warm weather. Here the peculiar advantages of stall-feeding come to our aid. *You will perceive that warmth produces a saving in food; it is indeed an equivalent for food.* Every thing that cools the body of an animal, causes a proportionate expenditure of food. In stall feeding, the temperature of the air of the stalls should be equally maintained, and they should be kept clean. The animals should be regularly fed, have plentiful litter, and be kept clean. If, as we have already said, warmth is an equivalent for food, it is obvious that the form in which the food is given cannot be immaterial. The more we facilitate the adaptation of the food for the organs of digestion, the greater will be the saving to us. The farmer cuts up his hay, straw and turnips to save some expenditure of force, hence of food, by the feeding animal. If the food contain much water of a temperature far lower than that of the animal, it must be raised to that temperature at the expense of a part of the food. This is obviated by the process of steaming. An ox, fed by Earl Spencer, consumed in a winter month (the temperature of the air 32°), 60 lbs. of mangel-wurzel a day. Now, in order to raise the temperature of the water of the mangel-wurzel to the temperature of the body of the ox, no less than one-twentieth of the food was expended. All feeders of pigs know that they thrive better on dry than on wet fodder. (Mr. B. sat down amidst great applause).

The CHAIRMAN then proposed "The healths of Mr. Stokes and of Mr. Allen," who made a few observations on the advantages of giving artificial food to animals in the straw yard. He had himself given oil-cake to cattle, and found it to remunerate him.

C. STOKES, Esq. rose to give his testimony to the principles laid down by Mr. Rawson and Mr. Bernays. He could fully bear out Mr. B.'s remarks on stall-feeding.

Mr. SMITH wanted to see science brought forward in connection with Agriculture. "We want," he said, "something definite and distinct on the formation of fat and muscle." He wanted defined what would produce most fat, milk, and cheese; and he hoped to provoke one of the gentlemen present to rise and define it. He hoped they would give them the kind and quantity of food to produce them.

Mr. C. W. WOOD, surgeon, of Woodhouse Eaves, said he would direct the few remarks he had to make exclusively to the expressed object of the meeting, namely, the feeding of cattle; and he viewed that as the most important matter with which the practical farmer had to do; in short, his whole life and exertions tended only to produce the greatest possible quantity of beef and mutton—if not in the shape of fat cattle, his supply of grain only produced the same effects in man. But before we talk of producing, it is necessary to ascertain correctly what it is we want to produce. All animals are composed of bone, muscle, fat, cellular tissue, wool, hair, horns, skin, and nails, and we find these very substances ready formed in vegetables, the power of nutrition in the animal having

nothing to do but select them from its food, and by means of the circulation to place them where they are wanted. If your object be, as in the young growing animal, to increase as well as to sustain it, you choose those vegetables which contain a large proportion of muscular fibre, or nitrogen and phosphate of lime for the bones, such as peas, beans, oats, barley, &c. If, with a full grown animal, your object be to sustain its condition with an increase of fat, you give those vegetables which contain fat ready formed, as lentils, Indian corn, oil-cake, &c. But as you have generally a mixed object in view, namely, to produce bone, muscle, and fat also, you must necessarily give a mixed food—the operations of which I will now explain. The composition of the animal and the vegetable world is identically the same, and the latter, wherever we find it, contains in a greater or less degree all the elements of the former. The vegetable world is sustained entirely from inorganic nature, the earth on which we tread, and the atmosphere we breathe, occupying a middle sphere, its whole existence being to collect materials to build up the animal, consequently entirely subservient to it. The inorganic world, again, is composed of a few simple elements, of which hydrogen, oxygen, nitrogen, carbon, phosphorus, sulphur, and some saline substances, as potassium, sodium and calcine, form the chief, the very elements of vegetable and animal life. Geology, chemistry, physiology, are therefore essential to the right understanding of this subject, bearing ever in mind that the lower are always administering to the wants and necessities of the higher orders of creation. There is no motion in an animal body, or emotion of mind, but what causes a corresponding absorption of the tissues of the body, and in order to keep up this daily waste, a certain amount of food is necessary. This is called sustaining the body. Thus cattle working hard require a larger amount of food than when at rest. This necessity being duly attended to, constitutes health. But fattening, gentlemen, is an unnatural condition, and requires an increase of substance. Hence the necessity of unnatural means, as the absence of exercise, light, and the influences of the atmosphere, a mixed diet (to bring out all the materials of the animal body to the greatest perfection) in a dry, warm state. *Mr. Childer's beautiful experiments proved that warmth alone with an animal would produce one-third more flesh, and at the expense of one-fourth less food, Mr. Norton also proved that the absence of light with warmth produced still greater results.* The reason of this is obvious. Every animal possesses both a nutritive and respiratory apparatus; the one to sustain the body, the other to support its vitality, by producing heat or warmth. This first object is effected by the gluten in the food principally, the basis of which is nitrogen. The second by the starch, sugar, and gum, contained in the food, which form bile, the basis of which is carbon. The bile passes into the intestines, where it meets with oxygen, and thus becomes carbonic acid. In this state it enters the circulation, where it meets with peroxide of iron (which the blood always contains), the carbon unites with the iron, and forms carbonate of iron. In this state it passes to the lungs, where it meets with fresh oxygen during inspiration, which re-converts the carbon in the carbonic acid, which passes off during expiration, while the peroxide of iron is reformed, and taken back by means of its carriers to be again

transformed into carbonate. The result of this combustion of carbon is heat. The heat of the animal body is nearly 100 degrees: all food, therefore, before it can be assimilated must be raised to its own temperature, which can only be done by the consumption of carbon, or in other words, food. Potatoes, linseed-cake, and oleaginous seeds, on account of the starch, sugar, oil, and gum they contain, are well adapted to accomplish this end. If we reflect for one moment on the immense importance of the liver and lungs in the animal economy, is it not strange to see the score of diseased ones which our shambles are constantly exhibiting? showing the great inattention the farmer pays to the comfort and well-being of his cattle. Fat is a reservoir of carbon for the system to draw upon for the purposes of combustion, in the event of the food not containing a sufficient quantity of the proper elements to keep up animal heat. As manure is an important result attending the feeding of animals, it may be well to remark that its quantity depends upon the refuse of food, and the amount of absorption going on in an animal's body, or in other words upon its own destruction, thus returning to inorganic nature, as food for vegetable life, the elements of its own nature. But the quality depends upon the quantity of nutritious food given to the animal. The young, growing animal requiring increase as well as sustenance, consumes all the nitrogen and fatty matter in its food. The milking cow the same. But in the full-grown, feeding animal a large quantity of these ingredients is not consumed: a rich and valuable manure is the result. In choosing animals for feeding purposes, the farmer often exhibits a remarkable knowledge of physiognomy. He likes a kindly-disposed, quiet-looking animal, with symmetry of carcass; one built for strength, broad across the back and loins, and long quarters, where large masses of muscles are placed, a narrow and deep chest, and "a good handler," or where there is a large quantity of fine, soft hair, with plenty of fatty matter underneath to nourish it. Thus furnished, he has only to put into operation the suggestions of science, and the result must necessarily be both profitable and useful. When we see the extensive application of capital, industry, and science to the manufactures of this country, and the comfort and wealth they produce to thousands of our fellow-creatures, also the dominant influence of its interests, threatening the downfall of the British farmer, surely it is time, and our bounden duty, to unite these same principles, that the abundance of the soil may satisfy both landlord and tenant, and be the means, under the blessing of Divine Providence, of producing plenty of cheap food to the many thousands of our wanting fellow-creatures.

The CHAIRMAN proposed the health of Messrs. Smith and Wood.

Mr. SMITH replied, and expressed his gratitude to Mr. Wood for his elaborate exposition of the subject, and still hoped to see science and practice combined much more than he had done.

Mr. WOOD proposed the health of the Chairman, which was received with loud cheers.

The CHAIRMAN rose and expressed his gratitude for the kindly manner in which they had drank his health. He would have gone farther into the subject before them had it not been so ably treated by gentlemen of practical science. It was from practical men they must expect

useful information; and when they had practical men for their leaders, it was their own fault if they did not benefit by them. He bore testimony to some of the principles laid down by the previous speakers, and said he should feel pleasure in presiding at their meetings. Again thanking them for the honor they had done him, he resumed his seat amidst applause.

Mr. BERNAYS again rose, and said—In order to obtain a fair proportion of fat and lean, it is of the utmost importance that you should be acquainted with the composition of food. We should be very much mistaken were we to judge of the value of food by its *bulk*. Green-top turnips, mangel-wurzel, and red beet, contain 89 per cent. of water; Swedes, 85 per cent.; potatoes, 72 per cent.; oats and wheat straw, 18 per cent.; hay, peas, and lentils, 16 per cent.; and beans only 14 per cent. Hence the latter food is infinitely superior, as to its feeding properties, to the former. But we have only spoken of the food in relation to water: it is necessary that we should understand each other when we make use of certain terms. It is but too indefinite if we include fleshening and fattening in the term *fattening*: the term *rearing* would then be more appropriate. But it would be still better if we distinguish between *fleshening*, or the formation of muscle, and *fattening*, or the formation of fat. According to the quantity of non-nitrogenized constituents of food capable of forming fat, in other words, according to the supposed fattening properties of food, they rank thus:—1. Oats, barley meal, and hay; 2. Beans and peas; 3. Lentils; 4. Potatoes; 5. Turnips and red beet. According to their fleshening properties, they stand thus:—1. Lentils; 2. Beans; 3. Peas; 4. Flesh; 5. Barley meal; 6. Oats; 7. Hay; 8. Carrots and potatoes; 9. Red beet; 10. Turnips; 100 lbs. of lentils are supposed to be capable of yielding 33 times as much muscle as 100 lbs. of turnips. Great advantage, therefore, results from the admixture of food. An animal which has been fed chiefly on oil-cake, would, on being turned out, increase in size much more slowly than the animal which has been fed on hay, or on turnips and hay. The oil-cake produces chiefly fat, and little flesh; hence the movement of the animal will consume much of the ready formed fat, or tallow. It is only when the oil-cake is given with fleshening food—such as beans, oats, and hay—that lean is proportionally formed. Warmth, confinement, and fattening food are most favorable for the formation of butter, fat, and tallow. Herbage—which is generally denominated *poor*, but which, in reality, is *rich* in nitrogenized constituents, and which cows have to crop themselves—is favorable to the formation of cheese, but not of butter.

Mr. STOKES—Would you recommend the food to be given in a warm state?

Mr. BERNAYS—Decidedly; a little lower than the temperature of their own bodies.

Mr. STOKES proposed "The health of Mr. Burrows, and the Stewards."

Mr. B. returned thanks, and said he had been much pleased with the discussion that afternoon. He was sorry that more practical men had not risen to take part in it. He had found by experience that cattle kept dry and warm consumed less, and fattened better.

Mr. HENSON rose and asked what mixture of food Mr. Bernays would recommend. He was at a loss to know how to put these different elements together. He hoped to hear at some fu-

ture discussion how to produce the largest amount of fat, without losing sight of the manure heap. He proposed the health of "Rev. E. Wilson;" who rose and returned thanks, and expressed his gratification with the discussion. He always found instruction at their meetings.

Mr. STOKES suggested that tables of the quantity and quality of food recommended, should be drawn out and some of the members requested to keep an ox or two, and give the result of their experiments for the benefit of others.

Mr. HENSON made another observation or two relative to the quantities of food and the manure heap, and

Mr. BERNAYS rose and said—I can only say, in answer to Mr. Henson, that I shall be happy to answer his questions as to the necessary quantities of food for producing flesh and fat, on some future occasion.

Mr. EATON said they had much science and a little practice. He would propose "The health of Mr. Walker," who would be able to give them a good deal of practical information (cheers).

Mr. WALKER said he had hoped to have taken his own pleasure on that occasion. He was almost afraid to venture an observation where there had been so much science. He felt inclined to walk away and largely benefit. As a practical man, he intended to make use of what part would suit him. The manure heap had been referred to, and he would observe, it was very well to have the whistle if they did not pay too dear for it. He would not recommend giving oil-cake to store cattle. They ought to be exceedingly careful how they gave oil-cake in the straw yard. Vegetables were the proper food for animals. He gave two pounds of oil-cake a day, and hay, to some cattle, and they did not do well; they were feverish; there was no swelling of the muscle, no lifting of the lean meat. He gave them turnips, and there was immediately an improvement.

Mr. SMITH made a few observations on the importance of attention to the temperature of the atmosphere to which cattle were exposed; and,

On motion of Mr. Henson, seconded by Mr. Stokes, it was resolved—"That this meeting entirely agrees with the science of nutrition now propounded, and recommends the practical farmer to test his theory by his experience."

Thanks were voted to the Chairman, and appropriately acknowledged; and the meeting, which occupied upward of four hours, separated.

SEX OF EGGS.—To know whether an egg will produce a male or female chick, it is directed to hold it between the eye and the candle, and if the vacancy caused by the air-bag, which every egg contains at the blunt end, appears to be on one side, it will produce a hen; if the vacancy be exactly in the centre, it will produce a cock. The largest eggs commonly produce cocks.

LIME.—Fertility does not always depend exclusively, or even very materially, on the presence of lime in the soil. Rich soils may contain two or twenty per cent. of lime, and so may poor ones.

TRIALS OF SULPHURIC ACID AND BONES FOR TURNIPS.

BY R. W. PURCHAS.

	T. cwt.	lbs
FIELD No. 1.—Soil, sandy loam upon old red sandstone, so completely worn out by the late tenant that a part without any manure, lying between the acre with acid and bones and the acre with dung, produced only, per acre.....	0	5 20
One acre, manured with 160 bushels of turf-ashes wetted with water.....	8	14 32
One acre, manured with 160 bushels of turf-ashes, 2 bushels of fine bone-dust, and 80 lbs. of brown acid (oil of vitriol), costing 12s.; the bones and acid dissolved and treated as below.....	14	5 68
One acre, manured with 20 yards of dung.	14	11 68

This field was limed with 108 bushels of lime per acre in 1842.

FIELD No. 2.—Soil, stone brash upon old red sandstone, limed in 1841.

	T. cwt.	lbs.
One acre, manured with 15 bushels of coal-ashes and 15 bushels of charcoal-dust, drilled in with the seed, produced.....	4	8 64
One acre, manured with 80 lbs. of brown acid and 2 bushels of fine bone-dust dissolved, mixed with 500 gallons of water, and sprinkled with a water-cart over the land before ridging up; and 15 bushels of coal-ashes, and 15 bushels of charcoal-dust, drilled in with the seed.....	12	11 48

The Swedes (Skirving's) were planted on the ridge, the first and second weeks in July, at 24 inches; the plants thinned to 9 inches; horse and hand-hoed three times.

Pulled, topped, tailed, and weighed, 14th January, 1845.

I had the brown sulphuric acid, strength 1.750, at $\frac{1}{4}$ d. per lb., from that highly respectable manufacturer, Mr. James Gibbs, Bristol; and the fine bone-dust, of excellent quality, from Messrs. H. and T. Proctor, Bristol, at 26s. per quarter.

The acid and bones for field No. 1 were treated as follows:—for 1 acre, an empty hogshead of about 100 gallons, with one head out, was used: 2 bushels (or 16 gallons) of bone-dust was put into the cask or tub, then 80 lbs. (or about $4\frac{1}{2}$ gallons) of acid, the mass being well stirred; to this was added 24 gallons of *boiling* water; the mixture being well stirred the whole time the water was being put in, to keep down the violent ebullition that ensued. In a few minutes the bone-dust was perfectly dissolved, and fit for use. The mixture was then taken in the tub into the field, put by the heap of turf-ashes, which being very dry, about 500 gallons of water were gradually added to the mixture, and thrown over the ashes; which, being well mixed, were then put into carts and distributed with a shovel into the drills, the ground ridged up, and immediately sown.

I put in about 3 acres per day, using three old hogsheads or tubs (worth about 5s. each;) and, when taken to the field, two lots were put together, the empty tub being used to mix the proper quantity of water before throwing over the ashes.

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A neighboring farmer had one carboy of acid *last* year; he used *dried mud* from a horse-pond to mix with the acid and bones; and he is so satisfied with the result that he has ordered 10 carboys of acid *this* year. My friend says the acid and bones beat every other manure, (guano, dung, &c.;) and are the *cheapest* and best of all manures for growing turnips. The soil, a poor sand, was limed with 108 bushels per acre, immediately before the mixture was put on.

I am convinced that, without lime in the soil, acid and bones will not act; this I witnessed in a neighbor's field last year—the field six years ago was part of a common, it was then broken up, and part limed the following year. Last year the whole field was planted with turnips—using 2 bushels of bone-dust and 80 lbs. of acid per acre; put on as on my field No. 2: the result was, the part limed produced a good crop for the season, beating 15 loads of dung; but the turnips on the part not limed, although coming up well, very soon died away, and in less than a month not a single plant was to be seen.

In the field No. 2, the acid and bones were treated as No. 1; when taken to the field in a water-cask holding 250 gallons of water (twice filled,) was used with half the quantity of mixture, and sprinkled over the land before being ridged up; the ashes were then drilled in with the seed.

His Grace the Duke of Richmond's plan of running the mixture and water *along the drills, after ridging*, is a much better plan than the above; and which, for the future, I shall adopt when using the mixture in a liquid state.

In every trial of acid and bones the turnips came into rough leaf a week before those planted the same day with other manures.

Pilstone, near Chepstow.

[Jour. of the Royal Agricul. Society of England.

ON THE USE OF SULPHURIC ACID WITH BONES AS COMPOST.

BY P. DAVIS.

WITH reference to Mr. Pusey's suggestion as to the propriety of using bone-dust (dissolved in sulphuric acid) along with *compost* instead of *water* for turnips, I can confirm his idea from practice, having last year manured 5 acres with only 13 bushels of bone-dust dissolved in 270 lbs. of sulphuric acid and 150 gallons of water. After standing twenty-four hours, the liquid was mixed with 3 cart-loads of coal-ashes, and left to remain for a week, during which time it was turned over two or three times. The mixture was then drilled along with the seed, and the result was a fair crop of common turnips, off a piece of poor land, without other manure, and at the cost of only 12s. 9d. per acre.

Milton House, near Penbridge,
Herefordshire.

[1b.]

THE HYDRAULIC RAM;

OR CHEAP METHOD OF HAVING A CONSTANT SUPPLY OF WATER.

It would be a waste of ink to dwell on the advantages of a constant and full supply of water about the homestead of every man's estate, in the country, and yet every reader may call to mind numberless instances where incalculable inconvenience and privation have been endured, and the most prodigal waste of labor committed from generation to generation, from that *vis inertiae*, that physical and moral lethargy of character, which too often leads us to drag on through life, neglecting expedients that the least thought would suggest, and the slightest exertion bring to our relief.

For years and years have we known large families to be supplied with all the water needed, or rather all that was used, but not a hundredth part of what was really *needed*, by keeping young persons constantly on the trot, to an unclean spring, sometimes at the distance of half a mile, bringing on their heads pails or "piggins" full at a time, when a cistern of simple construction made tight with water-cement, eight or ten feet in diameter and depth, would collect rain-water enough from the roof of the barn or the dwelling to give a constant supply of drinking water of the very best kind when filtered and iced. Again we have known, may it not be seen every day, where streams of water of the smallest volume might, with a very simple hydraulic contrivance, as we shall show, be made to afford a constant flow of pure water at the door of the kitchen, the dairy, and the stable.

So highly is the luxury of abundant water esteemed in this City, that in almost every house that is built, it is only necessary to turn a cock to have it at pleasure in every room and chamber.

Not aware of any thing more interesting to the Farmer, than the means of having at all times a full supply of water, not only for purposes strictly domestic, but for the use of all his domestic animals and for irrigation in our dry climate, we shall bring to the use of our patrons all the information we can collect, as to the various contrivances which may be resorted to for that purpose—we know how apt they are to be deterred from attempting any thing out of the common track, on account of the supposed or actual expense in the first instance, but a simple calculation of the remuneration to be derived from the saving of labor, and the money value,

to say nothing of the luxury, of a fuller supply of water, would convince them that a single year, some times even less, would reimburse them. There is to be considered, for example, as to the use of it for their domestic animals, not only the time that is saved, through the whole winter especially, in sending them to a distance to drink, but that they often suffer from not having a supply when Nature demands. The saving of manure too is not to be overlooked.

Our present purpose, however, is only to transfer for the use of our readers a few pages from a very valuable and interesting work, which ought to be added to the Library of every Farmer as well as every Mechanic, entitled "A descriptive and Historical account of Hydraulic and other Machines for raising water, ancient and modern, by THOMAS EWBANK," published in 1842 by D. Appleton & Co.

Although, according to this diligent and discriminating author, "the art of raising water, has ever been closely connected with the progress of civilization, so much so indeed, that the state of this art among a people may be taken as an index of their position on the scale of refinement, it seems passing strange that until this entertaining and instructive work made its appearance so recently, no one publication had ever been devoted to the great variety of devices which human ingenuity has devised for raising liquids.

Dry as may seem to be a history of water-lifting devices, we hardly know a book from which more curious and refreshing drafts of information might be made, than from this one by Mr. EWBANK, yet now we have not room to spare for that purpose, even if we could venture under any circumstances to give up for mere amusement, pages which can only be so used when amusement may be blended with obvious utility. Accordingly, we can only appropriate at present space for extracts explanatory of the principles and construction of the Hydraulic Ram of Montgolfier, which, as will be seen, may be adapted to every location in the country where there is the smallest stream of running water. How many farmers are there who have this invaluable resource unemployed, and who, by placing this paper in the hands of any honest ingenious mechanic, might at small expense have a perennial flow of water at his dwelling and barn-yard, for cooking, washing, bathing,

for watering his poultry, his stock, his dairy and his garden, and for a thousand uses that would suggest themselves, were the water at hand?

Of the machines appropriated to the fourth division of this work, centrifugal pumps and a few others have already been described. There remain to be noticed, the water ram, *canne hydraulique*, and devices for raising water by means of steam and other elastic fluids.

If the various operations of the lower animals were investigated, a thousand devices that are practiced by man would be met with, and probably a thousand more of which we yet know nothing. Even the means by which they defend themselves and secure their food or their prey, are calculated to impart useful information. Some live by stratagem, laying concealed till their unsuspecting victims approach within reach—others dig pitfalls to entrap them; and others again fabricate nets to entangle them, and coat the threads with a glutinous substance resembling the bird-lime of the fowler. Some species distill poison and slay their victims by infusing it into their blood; while others, relying on their muscular energy, suffocate their prey in their embraces and crush both body and bones into a pulpy mass. The tortoise draws himself into his shell as into a fortress and bids defiance to his foes; and the porcupine erects around his body an array of bayonets from which his enemies retire with dread. The strength of the ox, the buffalo and rhinoceros is in their necks, and which they apply with resistless force to gore and toss their enemies.—The elephant by his weight treads his foes to death; and the horse by a kick inflicts a wound that is often as fatal as the bullet of a rifle; the space through which his foot passes adding force to the blow.

There are numerous proofs of some of the lower animals being aware that the momentum of a moving body is increased by the space through which it falls. Of several species of birds which feed on shell fish, some, when unable to crush the shells with their bills, carry them up in the air, and let them drop that they may be broken by the fall. (The Athenian poet *Æschylus*, it is said, was killed by a tortoise that an eagle dropped upon his bald head, which the bird, it is supposed, mistook for a stone.) When the males of sheep or goats prepare to butt, they always recede backwards to some distance; and then rushing impetuously forward, (accumulating force as they go,) bring their foreheads in contact with a shock that sometimes proves fatal to both. The ancients, perhaps, from witnessing the battles of these animals, constructed military engines to act on the same principle. A ponderous beam was suspended at the middle by chains, and one end impelled, by the united efforts of a number of men at the opposite end, against walls which it demolished with slow but sure effect. The battering end was generally, and with the Greeks and Romans uniformly, protected by an iron or bronze cap in the form of a ram's head; and the entire instrument was named after that animal. It was the most destructive of all their war machinery—no building, however solid, could long withstand its attacks. Plutarch, in his life of Anthony, mentions one *eighty feet* in length.

The action of the ram is familiar to most people, but it may not be known to all that similar results might be produced by a liquid as by a solid—that a long column of water moving

with great velocity might be made equally destructive as a beam of wood or iron—yet so it is. Waves of the sea act as water-rams against rocks or other barriers that impede their progress, and when their force is increased by storms of wind, the most solid structures give way before them. The old light-house on the Eddystone rocks was thus battered down during a storm in 1703, when the engineer, Mr. Winstanley, and all his people perished.

The increased force which water acquires when its motion is accelerated, might be shown by a thousand examples: a bank or trough that easily retains it when at rest, or when slightly moved, is often insufficient when its velocity is greatly increased. When the deep lock of a canal is opened to transfer a boat or a ship to a lower level, the water is permitted to descend by slow degrees: were the gates opened at once, the rushing mass would sweep the gates below before it, or the greater portion would be carried in the surge quite over them—and perhaps the vessel also. A sluggish stream drops almost perpendicularly over a precipice, but the momentum of a rapid one shoots it over, and leaves, as at Niagara, a wide space between.—It is the same with a stream issuing from a horizontal tube—if the liquid pass slowly through, it falls inertly at the orifice, but if its velocity be considerable, the jet is carried to a distance ere it touches the ground. The level of a great part of Holland is below the surface of the sea, and the dykes are in some parts thirty feet high; whenever a leak occurs, the greatest efforts are made to repair it immediately, and for the obvious reason that the aperture keeps enlarging and the liquid mass behind is put in motion towards it; thus the pressure is increased and, if the leak be not stopped, keeps increasing till it bears with irresistible force all obstructions away. A fatal example is recorded in the ancient history of Holland:—An ignorant burgher, near Dort, to be revenged on a neighbor, dug a hole through the dyke opposite the house of the latter, intending to close it after his neighbor's property had been destroyed; but the water rushed through with an accelerating force, till all resistance was vain, and the whole country became deluged. The ancients were well aware of this accumulation of force in running waters. Allusions to it are very common among the oldest writers, and various maxims of life were drawn from it. The beginning of strife, says Solomon, "is as when one letteth out water"—the "breach of waters"—"breaking forth of waters"—"rushing of mighty waters," &c. are frequently mentioned, to indicate the irresistible influence of desolating evils when once admitted.

That the force which a running stream thus acquires may be made to drive a portion of the liquid far above the source whence it flows, is obvious from several operations in nature.—During a storm of wind, long swelling waves in the open sea alternately rise and fall, without the crests or tops of any being elevated much above those of the rest; but when they meet from opposite directions, or when their progress is suddenly arrested by the bow of a ship, by rocks, or other obstacles, part of the water is driven to greater elevations. There is a fine example of this at the Eddystone rocks—the heavy swells from the Bay of Biscay and from the Atlantic, roll in and break with inconceivable fury upon them, so that volumes of water are thrown up with terrific violence, and the

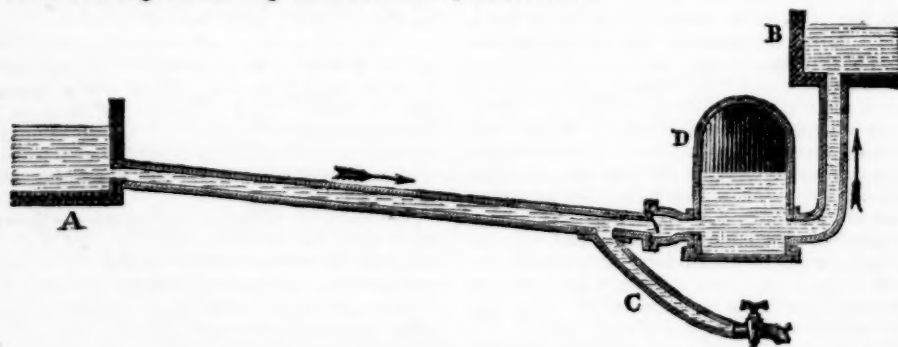
celebrated light-house sometimes appears from this cause like the pipe of a fountain enclosed in a stupendous *jet d'eau*. The light-room in the old light-house was sixty feet above the sea, and it was often buried in the waves, so immense were the volumes of water thrown over it.

The hydraulic ram raises water on precisely the same principle: a quantity of the liquid is set in motion through an inclined tube, and its escape from the lower orifice is made suddenly to cease, when the momentum of the moving mass drives up, like the waves, a portion of its own volume to an elevation much higher than that from which it descended. This may be illustrated by an experiment familiar to most people. Suppose the lower orifice of a tube (whose upper one is connected to a reservoir of water) be closed with the finger and a very minute stream be allowed to escape from it in an upward direction—the tiny jet would rise nearly to the surface of the reservoir; it could not, of course, ascend higher—but if the finger were then moved to one side so as to allow a free escape till the whole contents of the tube were rapidly moving to the exit, and the orifice then at once contracted or closed as before, the jet would dart far *above* the reservoir; for in addition to the hydrostatic pressure which drove it up in the first instance, there would be a new force acting upon it, derived from the *motion* of the water. As in the case of a hammer of a few pounds weight, when it rests on the anvil it exerts a pressure on the latter with a force due to its weight only, but when put in motion by the hand of the smith, it descends with a force that is equivalent to the pressure of perhaps a ton.

Every person accustomed to draw water from pipes that are supplied from very elevated sources, must have observed, when the cocks or discharging orifices are suddenly closed, a jar or tremor communicated to the pipes, and a snapping sound like that from smart blows of a hammer. These effects are produced by blows which the ends of the pipes receive from the water; the liquid particles in contact with the plug of a cock, when it is turned to stop the discharge, being forcibly driven up against it by those constituting the moving mass behind.—

The philosophical instrument named a *water hammer* illustrates this fact. The effect is much the same as if a solid rod moved with the same velocity as the water through the tube until its progress was stopped in the same manner, except that its momentum would be concentrated on that point of the pipe against which it struck, whereas with the liquid rod the momentum would be communicated equally to, and might be transmitted from *any* part of, the lower end of the tube; hence it often occurs that the ends of such pipes, when made of lead, are swelled greatly beyond their original dimensions. We have seen some $\frac{3}{4}$ of an inch bore, become enlarged to $1\frac{1}{4}$ inches before they were ruptured. At a hospital in Bristol, England, a plumber was employed to convey water through a leaden pipe from a cistern in one of the upper stories to the kitchen below, and it happened that the lower end of the tube was burst nearly every time the cock was used. After several attempts to remedy the evil, it was determined to solder one end of a smaller pipe immediately behind the cock, and to carry the other end to as high a level as the water in the cistern; and now it was found that on shutting the cock the pipe did not burst as before, but a jet of considerable height was forced from the upper end of this new pipe: it therefore became necessary to increase its height to prevent water escaping from it—upon which it was continued to the top of the hospital, being twice the height of the supplying cistern, but where, to the great surprise of those who constructed the work, some water still issued: a cistern was therefore placed to receive this water, which was found very convenient, since it was thus raised to the highest floors of the building without any extra labor. Here circumstances led the workmen to the construction of a water-ram without knowing that such a machine had been previously devised.

The first person who is known to have raised water by a ram, designed for the purpose was, Mr. Whitehurst, a watchmaker of Derby, in England. He erected a machine similar to the one represented by the next figure, in 1772. A description of it was forwarded by him to the Royal Society, and published in vol. iv. of their Transactions.



No. 167. Whitehurst's Water-Ram.

A represents the spring or reservoir, the surface of the water in which was of about the same level as the bottom of the cistern B. The main pipe from A to the cock at the end of C, was nearly six hundred feet in length, and one and a half inches bore. The cock was sixteen feet below A, and furnished water for the kitchen, offices, &c. When it was opened the liquid

column in A C was put in motion, and acquired a velocity due to a fall of sixteen feet; and as soon as the cock was shut, the momentum of this long column opened the valve, upon which part of the water rushed into the air-vessel and up the vertical pipe into B. This effect took place every time the cock was used, and as water was drawn from it at short intervals for

household purposes, "from morning till night—all the days in the year," an abundance was raised into B, without any exertion or expense.

Such was the first water-ram. As an original device, it is highly honorable to the sagacity and ingenuity of its author; and the introduction of an air vessel, without which all apparatus of the kind could never be made durable, strengthens his claims upon our regard. In this machine he has shown that the mere act of drawing water from long tubes for ordinary purposes, may serve to raise a portion of their contents to a higher level; an object that does not appear to have been previously attempted, or even thought of. The device also exhibits another mode, besides that by pressure engines, of deriving motive force from liquids thus drawn, and consequently opens another way by which the immense power expended in raising water for supplying cities, may again be given out with the liquid from the lateral pipes. Notwithstanding the advantages derived from such an apparatus, under circumstances similar to those indicated by the figure, it does not appear to have elicited the attention of engineers, nor does Whitehurst himself seem to have been aware of its adaptation as a substitute for forcing pumps, in locations where the water drawn from the cock was not required, or could not be used. Had he pursued the subject, it is probable the idea of opening and closing the cock (by means of the water that escaped) with some such apparatus as that invented by Fludd, would have occurred to him, and then his machine being made self-acting, would have been applicable in a thousand locations. But these additions were not made, and the consequence was, that the invention was neglected, and but for the one next to be described, it would most likely have passed into oblivion, like the steam machines of Branca, Kircher, and Decaus, till called forth by the application of the same principle in more recent devices.

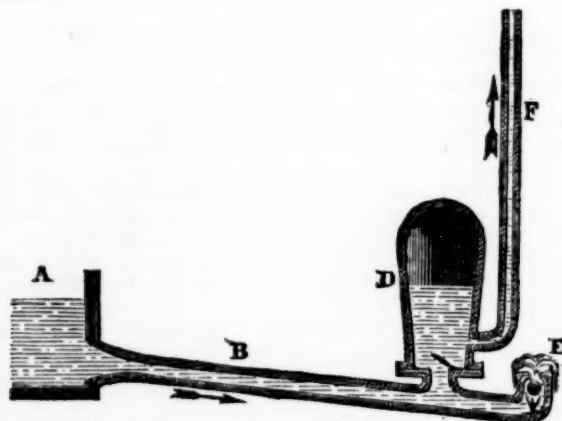
Whenever we peruse accounts of the labors of ingenious men, in search of new discoveries in science or the arts, sympathy leads us to rejoice at their success and to grieve at their failure: like the readers of a well written novel who enter into the views, feelings and hopes of the hero; realize his disappointments, partake of his pleasures, and become interested in his fate; hence something like regret comes over us, when an industrious experimenter, led by his researches to the verge of an important discovery, is, by some circumstance, diverted (perhaps temporarily) from it; and a more fortunate or more sagacious rival steps in and bears off the prize from his grasp—a prize, which a few steps more would have put him in possession of. Thus Whitehurst with the water-ram, like Papin with the steam engine, discontinued his researches at the most interesting point—at the very turning of the tide that would have carried him to the goal; and hence the fruit of both their labors has contributed but to enhance the glory of their successors.

The *Bélier hydraulique* of Montgolfier was invented in 1796. (Its author was a French paper maker, and the same gentleman who, in conjunction with his brother, invented balloons in 1782.) Although it is on the principle of Whitehurst's machine, its invention is believed to have been entirely independent of the latter. But if it were even admitted that Montgolfier was acquainted with what Whitehurst had done, still he has, by his improvements, made

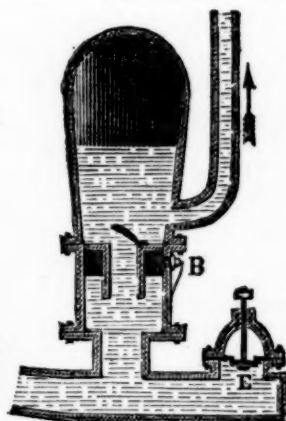
the ram entirely his own. He found it a comparatively useless device, and he rendered it one of the most efficient—it was neglected or forgotten, and he not only revived it, but gave it a permanent place among hydraulic machines, and actually made it the most interesting of them all. It was, previous to his time, but an embryo; when, like another Prometheus, he not only wrought it into shape and beauty, but imparted to it, as it were, a principle of life, that rendered its movements *self-acting*; for it requires neither the attendance of man, nor any thing else, to keep it in play, but the momentum of the water it is employed to elevate. Like the organization of animal life, and the mechanism by which the blood circulates, the pulsations of this admirable machine incessantly continue day and night, for months and years while nothing but deficiency of the liquid, or defects in the apparatus can induce it to stop.—It is, compared to Whitehurst's, what the steam-engine of Watt is to that of Savary or Newcomen.

Montgolfier positively denied having borrowed the idea from any one—he claimed the invention as wholly his own, and there is no reason whatever to question his veracity. The same discoveries have often been, and still are, made in the same and in distant countries, independently of each other. It is a common occurrence, and from the constitution of the human mind will always be one. A patent was taken out in England for self-acting rams in 1797 by Mr. Boulton, the partner of Watt, and as no reference was made in the specification to Montgolfier, many persons imagined them to be of English origin, a circumstance that elicited some remarks from their author. "Cette invention (says Montgolfier) n'est point d'origine Anglaise, elle appartient toute entière à la France; je déclare que j'en suis le seul inventeur, et que l'idée ne m'en a été fournie par personne; il est vrai qu'un de mes amis a fait passer, avec mon agrément, à MM. Watt et Boulton, copie de plusieurs dessins que j'avais faits de cette machine, avec un mémoire détaillé sur ses applications. Ce sont ces mêmes dessins qui ont été fidèlement copiés dans la patente prise par M. Boulton à Londres, en date du 13 Décembre 1797; ce qui est une vérité dont il est bien éloigné de disconvenir, ainsi que le respectable M. Watt." We have inserted this extract from Hachette, because we really supposed on reading the specification of Boulton's patent in the Repertory of Arts, (for 1798, vol. ix.) that the various modifications of the ram there described were the invention of that gentleman. The patent was granted to "Matthew Boulton, for his invention of improved apparatus and methods for raising water and other fluids."

No. 168 represents a simple form of Montgolfier's ram. The motive column descends from a spring or brook A through the pipe B, near the end of which an air chamber D, and rising main F, are attached to it as shown in the cut. At the extreme end of B, the orifice is opened and closed by a valve E, instead of the cock in No. 167. This valve opens downwards and may either be a spherical one as in No. 168, or a common spindle one as in No. 169. It is the play of this valve that renders the machine self-acting. To accomplish this, the valve is made of, or loaded with, such a weight as just to open when the water in B is at rest; i. e. it must be so heavy as to overcome the pressure against its under side when closed, as represented at



No. 168. Montgolfier's Ram.



No. 169. The same.

No. 169. Now suppose this valve open as in No. 168, the water flowing through B soon acquires an additional force that carries up the valve against its seat; then, as in shutting the cock of Whitehurst's machine, a portion of the water will enter and rise in F, the valve of the air chamber preventing its return. When this has taken place the water in B has been brought to rest, and as in that state its pressure is insufficient to sustain the weight of the valve, E opens; (descends) the water in B is again put in motion, and again it closes E as before, when another portion is driven into the air vessel and pipe F; and thus the operation is continued, as long as the spring affords a sufficient supply and the apparatus remains in order.

The surface of the water in the spring or source should always be kept at the same elevation, so that its pressure against the valve E may always be uniform—otherwise the weight of E would have to be altered as the surface of the spring rose and fell.

This beautiful machine may be adapted to numerous locations in every country. When the perpendicular fall from the spring to the valve E is but a few feet, and the water is required to be raised to a considerable height through F, then, the length of the ram or pipe B, must be increased, and to such an extent that the water in it is not forced back into the spring when E closes, which will always be the case if B is not of sufficient length. Mr. Millington, who erected several in England, justly observes that a very insignificant pressing column is capable of raising a very high ascending one, so that a sufficient fall of water may be obtained in almost every running brook, by damming the upper end to produce the reservoir, and carrying the pipe down the natural channel of the stream until a sufficient fall is obtained. In this way a ram has been made to raise one hundred hogsheads of water in twenty-four hours to a perpendicular height of one hundred and thirty-four feet, by a fall of only four feet and a half.—M. Fischer of Schaffhausen, constructed a water-ram in the form of a beautiful antique altar, nearly in the style of that of Æsculapius, as represented in various engravings. A basin about six inches in depth, and from eighteen to twenty inches in diameter, received the water that formed the motive column. This water flowed through pipes three inches in diameter that descended in a spiral form into the base of the altar; on the valve opening a third of the

water escaped, and the rest was forced up to a castle several hundred feet above the level of the Rhine.

A long tube laid along the edge of a rapid river, as the Niagara above the falls, or the Mississippi, might thus be used instead of pumps, water wheels, steam-engines and horses, to raise the water over the highest banks and supply inland towns, however elevated their location might be; and there is scarcely a farmer in the land but who might, in the absence of other sources, furnish his dwelling and barns with water in the same way, from a brook, creek, rivulet or pond.

If a ram of large dimensions, and made like No. 168, be used to raise water to a great elevation, it would be subject to an inconvenience that would soon destroy the beneficial effect of the air chamber. When speaking of the air vessels of fire-engines, in the third book, we observed that if air be subjected to great pressure in contact with water, it in time becomes incorporated with or absorbed by the latter.—As might be supposed, the same thing occurs in water-rams; as these when used are incessantly at work both day and night. To remedy this, Montgolfier ingeniously adapted a very small valve (opening inwards) to the pipe beneath the air chamber, and which was opened and shut by the ordinary action of the machine. Thus, when the flow of the water through B is suddenly stopped by the valve E, a partial vacuum is produced immediately below the air chamber by the recoil of the water, at which instant the small valve opens and a portion of air enters and supplies that which the water absorbs. Sometimes this *snifting* valve, as it has been named, is adapted to another chamber immediately below that which forms the reservoir of air, as at B in No. 169. In small rams a sufficient supply is found to enter at the valve E.

Although air chambers or vessels are not, strictly speaking, constituent elements of water-rams, they are indispensable to the permanent operation of these machines. Without them, the pipes would soon be ruptured by the violent concussion consequent on the sudden stoppage of the efflux of the motive column. They perform a similar part to that of the bags of wool, &c. which the ancients, when besieged, interposed between their walls and the battering rams of the besiegers, in order to break the force of the blows.

STEAMED BONES.

[To the Editor of the North British Agriculturist.]

SIR:—As a constant reader of your journal, I have from time to time watched the discussion regarding the preparation for manure by steam to bones, as recommended by Mr. Blackhall, of Edinburgh; and as I intended to have erected a mill for crushing bones for the use of my own farm, I thought of adopting Mr. Blackhall's plan, and have it now in operation. I have steamed four fulls of my tank, (which holds two tons of rough bones,) for four, five, and six hours, at a pressure of 50 lbs. on the inch, and am now applying the stuff to my turnip crop, at the rate of 10 to 15 bushels per acre, with 20 cart-loads of dung. I have, however, sown a part by itself, and will communicate to you the result when the crops are advanced.

I may state, in the mean time, that my opinion is not favourable to this mode of preparation of bones. I have been in the habit of crushing bones in the usual way by rolling, and I think it quite likely that the old way is better than the new, and also as cheap. I find that after the bones are steamed, they would still require a mill to grind them. It takes two of my men ten hours with mallets on a stone, to beat down one ton of bones; and with a small mill I

had attached to my water-wheel, I could crush four to five tons of bones to go through a three-quarter riddle in a day; and although I think it quite likely that the half of the quantity of bones prepared by steam will raise an equally good crop of turnips, as the double of the quantity prepared by crushing in the usual way, yet I am sure they will not last so long in the ground. The half of the expense of grinding by rollers, is from picking iron, stones, &c., from the bones to prevent breakage of machinery, and I thought this would be quite obviated by the steaming process; but I now find that I will be obliged to erect a machine for grinding the bones after being steamed, and must pick the bones as carefully as I used to do, and therefore I am of opinion that the steaming process will be no advantage. I have a pipe from the bottom of the bone tank, and by it draw off all the grease and gelatine into a tank, and again have mixed this with ground wood charcoal, and mixed it again up with the bruised bones, so that nothing is lost. And you may expect to hear from me again, when I can inform you regarding the progress of my crop. I am, sir, &c.,

A BONE-GATHERER.

NOTES ON THE MANAGEMENT OF SHEEP:

FOUNDED UPON REPORTS OF COMPETITORS WHO GAINED PREMIUMS AT THE WOOL COMPETITION HELD AT EDINBURGH IN 1845.

CHEVIOT SHEEP.—*Mr. Anderson, Sandhope, Selkirk.*—The flock consists of about 1,000 ewes of ages varying from one to six years, and it was reared exclusively on coarse hill pasture, elevated from 1,000 to 2,000 feet above the level of the sea. The stock ewes get no artificial food, except on the occasion of a severe storm, when they are supplied with a little natural hay. To afford such aid, unless urgently required, would tend to lessen the exertion of the sheep to provide for themselves. The tups are bred from selected ewes by the best rams, and put on grass and turnips during winter and spring. The washing takes place about the end of June in a pond, into which the sheep are made to leap from a platform raised about two feet above the surface of the water, and then caused to swim twice or oftener across, as may be necessary for cleansing them. The clipping is performed about eight days after. The animals are laid on a stool, the operator proceeding lengthways in parallel lines an inch in breadth, and making the cuts as low and smooth as possible. The price obtained for the clip of Cheviot wool in 1845 was 28s. 6d. per stone of 24 lbs.; and for the black-faced clip, 13s. per stone. Wethers are not kept; but barren ewes, sold from the

hill pasture at the end of autumn, weigh about 13 lbs. per quarter. The average weight of a Cheviot fleece is 3 lbs. 7 oz.; and of a black-faced, 4 lbs.

The black-faced flock, containing 600 breeding ewes, is similarly managed.

Mr. Gentle, Dell, Inverness.—The flock, in which there are 500 shearing ewes, is washed about the 18th of June. The sheep are driven three times through an arm of a fresh-water lake, having to leap into the water from a breastwork four feet high, and to swim from thirty to forty yards. The clipping follows about the 22d of the same month. It is done longitudinally, with an even and rather bare cut. The clipper is seated on a smearing-stool, which is covered with a tough sod, to prevent the animals being hurt. The pasturage consists of common mountain grasses, much intermixed with heather, and its altitude varies from 1,000 to 2,000 feet above the sea. In winter and spring, however, the sheep, when the inclemency of the weather makes it necessary, are brought to lower ground, at an elevation not exceeding 100 feet. The clips of 1844 and 1845 were sold at 18s. per stone of 24 lbs. Three-year-old ewes have been sold for £25 10s. per score—a price considered less

than their value. Such sheep, getting good turnip feeding till the end of March, would weigh, on an average, from 18 to 20 lbs. per quarter; but individual sheep have weighed 25 lbs. per quarter. The fleeces of the shearling ewes will be about 4 lbs. weight each on an average; but, taking fleeces of all classes, the average per fleece will be about 5 lbs. The fleeces are understood to consist of laid wool.

Mr. Tweedie, Deuchrie, Prestonkirk.—The flock contains from 300 to 400 shearlings. The sheep are washed in June by making them leap three or four times into a pool, and swim fifteen or twenty yards. They are generally clipped within a week after, the shears being used longitudinally. The pasturage is on the Lammermuirs, poor and mostly heath. In winter and spring, turnips and hill pasture are the means of support, each being afforded daily. The clip of hogg and ewe wool in 1845 sold at 29s. 6d. per stone of 24 lbs. For the last five years, a bath mixture, prepared by Brown of Haddington, has been used in autumn; and, while it has kept the stock quite clean, it is easily applied. Three men to dip, and a boy to drive water, can easily bathe 600 or 800 sheep in a day. The apparatus is not very expensive, and it promotes the comfort both of men and sheep. It consists of a tub for dipping, and a large trough in which the sheep, after being dipped, stand to drip—and so constructed that the drippings run back into the tub. Since the adoption of this plan, the wool has always been considered very fine, and, indeed, the best shown at a local exhibition.

BLACK-FACED SHEEP.—*Mr. Vere Iving, Newtown House, Moffat.*—In the district of Moffat it is not customary to wash black-faced sheep. The shearling and barren ewes, and the rams, were, in 1845, clipped on the 2d July, and the rest of the flock, consisting of ewes rearing lambs, on the 19th of the same month. In 1844, the clipping of the latter class of stock took place some days earlier; but this is not considered advisable, as the wool last season was better risen than in the preceding year. In clipping black-faced sheep, the shears are run from head to tail; but, in the case of Cheviot sheep, they are directed over the shoulder and back. The latter method produces a neater clip, but the former is more expeditious. The farm rises from a base of 910 feet above the level of the sea, to an altitude of 1,550 feet above it. The lower portion, which is divided into parks, and is well sheltered, is occupied with dairy-stock, grain, green-crop and hay; and, for the greater part of the year, the sheep are entirely confined to the upper division, or steep ground. The pasture is short and of a bright color, intermixed with coarse bent, which requires to be burnt in spring. Some years ago, part of the bent ground was plowed, heavily limed, and sown with grass seed; and thus a great improvement was effected, the bent having been replaced by a bright green pasturage, which cannot be distinguished from those portions of the ground that are not naturally covered with bent. In winter and spring, the sheep, if their condition seems to demand it, are admitted into such of the lower parks as have been cut for hay, or pastured during the summer by the dairy stock, which is then fed in the house. The sheep are let down from the higher ground in the morning, but are invariably put out of the parks between one and two o'clock in the afternoon. In the event of a severe snow-storm, they are fed

with meadow hay, which is carried out to them. In weaning the ewe lambs intended for stock, they are put into one of the parks for a week, and then allowed to return to their mothers, whom they recognize, but no longer attempt to suck. An advantage of this plan is that the lambs follow their dams through the winter, and, if there is snow, they are helped by them to scrape, so that they do not so often need to be fed with hay as when they are kept separate all the winter. The last clip sold fetched 12s. per stone of 24 lbs. for fleeces of all denominations.

CROSS BETWEEN CHEVIOT AND LEICESTER SHEEP.—*Mr. Brown, Halls, Dunbar.*—In the flock there are about 600 hogs. The usual period for washing is about the end of May or beginning of June; and the plan followed is that of placing four or five men in a stream of clear water up to their middle, one above the other, and passing the sheep, one by one, from the lowest to the highest—each man, in turn, plunging the animal in the water. The shearing follows in three or four days, when the natural oiliness of the wool, extracted by the washing, is restored. The operation is performed in an open shed, laid with green sods. One or two women attend for the purpose of freeing the fleeces from particles of clotted wool, and afterward winding them. The price obtained for the clip last sold was 31s. per stone of 24 lbs.—The pasture on which the Cheviot ewes are grazed, from which the half-bred lambs are reared, is situated on the northern boundary of the Lammermuirs. The lambs are weaned about the middle of August, when they are removed to the sown pastures on the farm. In November they are bathed with a mixture of tobacco liquor and spirit of tar, in the proportion of half a Scotch pint of the former to a wine-glassful of the latter for each sheep. They have then a few turnips laid on their pasture, and when they have fully acquired a taste for them, they are folded on turnips alone during winter and spring, or until grass is ready for them—which, on the high situation to which they are transferred, is, in ordinary seasons, about the middle of April or beginning of May.

HOME AND FRIENDS.

BY CHARLES SWAIN.

OH! there's a power to make each hour
As sweet as Heaven designed it;
Nor need we roam to bring it home,
Though few there be that find it!
We seek too high for things close by,
And lose what Nature found us;
For life hath here no charm so dear
As home and friends around us!

We oft destroy the present joy
For future hopes—and praise them,
While flowers as sweet bloom at our feet,
If we'd but stoop to raise them!
For things afar still sweetest are
When Youth's bright spell hath bound us;
But soon we're taught the earth hath naught
Like home and friends around us!

The friends that speed in time of need,
When Hope's last reed is shaken,
To show us still that, come what will,
We are not quite forsaken:
Though all were night, if but the light
From Friendship's altar crowned us,
'T would prove the bliss of earth was this—
Our home and friends around us!

ANECDOTES OF BIRDS.

It is a general observation of the country people, that when there is an unusual number of hawthorn and holly berries, there will be a hard winter. If it be so, it is a proof of the care which the Almighty takes of his creatures. How many birds would perish during a severe winter, if this provision had not been made for them! Even the circumstance of some springs not freezing is an instance of the same goodness. If they did, the destruction of animal life would be much greater than it now is. At present many birds are able in hard weather to find water and food. The robin, thrush, and blackbird, with woodcocks and snipes, resort to these springs, and are able to support life on the worms and insects they find in or by the side of them, till more genial weather arrives.* In deep snow many birds frequent woods, where, amongst dead or decayed trees, and in the bark of others, they discover and feed upon insects. Horses and deer scrape away the snow with their feet to get at the grass, and hares and rabbits feed on the bark of trees. The titmouse in frosty weather gets near houses and picks meat from bones. The hedge-sparrow and wren search for insects at the bottoms of hedges, where the snow has not penetrated. The wood-pigeon feeds on the tops of turnips; while sparrows, finches, yellowhammers, &c., get into rick-yards to satisfy their hunger. Most birds are thus able to procure some sort of sustenance during a hard winter; and some animals remain during that period in a state of torpor, from which the influence of the sun in spring revives them. Insects appear but little affected by cold weather, as we see many on the first mild day after the severest frosts. Bees survive the coldest winters in Russia, and afterwards lay up much store of honey.

We thus see that, however miserable the condition of birds in severe weather may appear to a cursory observer, they have resources provided for them in various ways. The same beneficent Being who created them provided at the same time for their subsistence. It is man who occasions the chief miseries of the creatures which surround him. When, therefore, we consider that these creatures are the objects of God's care, how careful ought we to be never to inflict any unnecessary pain or misery upon

them! I should not think kindly of that man who could wantonly put his foot upon a worm which was crossing his path, or destroy a fly for the gratification of doing so.

I take great pleasure in watching the activity of those birds which feed on flies. The water-wagtail darts after them with great rapidity, and when collecting them for her young, places each fly as she catches it in the corner of her mouth till there is a considerable accumulation of them. When she opens her mouth to seize a fly, one expects to see the others fall from it; but this never happens. I have also observed that, when a wagtail has a young cuckoo to feed, she collects a larger number of flies in her mouth than when she is engaged in supporting her own young. When this bird has collected a sufficiency, she gives two or three chirps as she approaches her nest, which her brood understand, and they are ready with open mouths to receive the food. The young cuckoo understands these chirps, and I have seen him eagerly prepare himself for the approach of his foster-mother long before he could see her.

I have never observed that the swallow, in hawking for flies for her young, accumulates them by the side of her mouth, as the wagtail does. One hears the snap of her beak when she takes a fly, and it is curious to see the instinct which prevents seizing a wasp during her rapid flight. Swallows are indefatigable in providing food for their young while they are in the nest; but should the nest by any accident be brought to the ground before the brood are able to fly, the old birds take no further notice of them: they are left to crawl about and die. The affection which birds show to their young is very great, and continues in many instances till the next breeding season. Our common hen will keep her last brood by her side till she lays again, and I have observed that they roost next her during a whole winter after they are full-grown. Her interest in them does not cease till the following spring, when she has a fresh charge to bring up. An instance of this care and affection in sparrows is mentioned by Mr. Graves in his *British Ornithology*.

"Having noticed," he says, "that the parent birds continued to bring food to the nest for some months after the brood had left it, we had the curiosity to place a ladder against the wall for the purpose of ascertaining the cause, when, to our surprise, we found a full-grown bird in the nest,

* "Birds are extremely important creatures for the economy of nature in general. They destroy innumerable insects, and the thoughtless extirpation of some birds, supposed to be noxious, such as sparrows, crows, &c., has generally given rise to an infinitely more prejudicial multiplication of vermin."

BLUMENBACH.

which had got its leg completely entangled in some thread which had formed part of the nest, in such a manner as to entirely prevent it leaving the nest. Wishing to see how long the industry of the old birds would be extended in behalf of their imprisoned offspring, we left the bird and nest in the state we found it, and observed that the parent birds continued to supply food during the whole of the autumn and some part of the winter months; but the weather setting in very severe soon after Christmas, fearing the severity of the weather would occasion the death of the imprisoned bird, we disengaged its leg, and in a day or two it accompanied the old ones in search of food; but they continued to feed it till the month of March, and during the whole time they all nestled in the same spot."

Some birds sit so close on their eggs, that no approach of danger can induce them to quit their nest. Gilbert White gives a very interesting anecdote of this in the case of a raven. "In the centre of a grove there stood an oak, which, though shapely and tall on the whole, bulged out into a large excrescence about the middle of the stem. On this a pair of ravens had fixed their residence for such a series of years, that the oak was distinguished by the title of the Raven-tree. Many were the attempts of the neighbouring youth to get at this eyrie: the difficulty whetted their inclinations, and each was ambitious of surmounting the arduous task. But when they arrived at the swelling, it jutted out so in their way, and was so far beyond their grasp, that the most daring lads were awed, and acknowledged the undertaking to be too hazardous. So the ravens built on, nest upon nest, in perfect security, till the fatal day arrived in which the wood was to be levelled. It was in the month of February when those birds usually sit. The saw was applied to the butt, the wedges were inserted into the opening, the woods echoed to the heavy blows of the beetle or mallet, the tree nodded to its fall; but still the dam sat on. At last, when it gave way, the bird was flung from her nest; and, though her parental affection deserved a better fate, was whipped down by the twigs, which brought her dead to the ground."

It is not easy to account for the variation we sometimes perceive in the plumage of birds of the same species. I have observed a rook with one white wing during the last three years in the rookery in Hampton-Court Park; and I saw a sparrow nearly white among a flock of those birds at West Molesey. A linnet was shot and brought to me from the same place, which was beautifully mottled with white and brown.

Some years ago I was shown some white blackbirds in the grounds of a nobleman at Blackheath, which had bred there; and what showed this was not an accidental circumstance, they produced young of the same colour as themselves.

Partridges manifest great caution in choosing the place where they intend to fix their nest. I have observed them remain near the same spot for some weeks before the female lays her eggs; and if in the mean time they should discover the retreat of any animal in the neighbourhood, who is likely to be injurious to them, they shift their quarters. I have generally noticed that partridges lodge themselves at night near the middle of a field, probably being aware that they are safer in this situation from the attacks of stoats or weasels, than if they got nearer hedges, under the roots or banks of which these animals conceal themselves. Some birds utter a peculiarly plaintive cry on the approach of danger. Even when they are concealed in the midst of a thick hedge they give warning, should any marauder in the shape of a cat or a weasel come near them. There is something in this mournful cry which cannot be misunderstood. The blackbird and thrush have it, but I have more generally observed it in the hedge-sparrow and red-breast.

There is something extremely amusing in watching the motions of a family of the long-tailed titmouse, or, indeed, of any of the *Parus* tribe. The parents and their young, which are very numerous, associate together from the time they leave their nest to the following spring. The incessant call they make seems intended to keep the whole family together in their passage through a wood, or among thick shrubs, in search of insects. Their motions and flight are very quick; and there is a pleasing cheerfulness and rapidity in all they do. The complacency in the notes of young birds, while they are receiving food from the old ones, always gives me the impression that it arises from gratitude and affection. Even after the parent bird has departed in search of more food, this little call of love is continued with a flutter of the wings, which is made with more rapidity as the note and flight of the mother are heard on her return. These little blandishments may be seen more particularly during the first few days after the young birds have left the nest. While they are in it, they preserve a greater degree of silence; and if any one approaches their nest, they squeeze into it, and keep themselves as flat as possible. This early instinct is peculiar to the young of wild animals; while those of many of our domestic kinds seem fearless of danger from their

very birth. Can we doubt, but that animals are indebted for this extraordinary apprehension of the danger which threatens them to an instinct implanted in them as their safeguard by a kind and beneficent Providence? If animals had escaped from some particular danger, they would naturally avoid it in future: but we see that they endeavour to shun it in cases where they have had no previous intimation of it. A young duck, as soon as it has escaped from its shell, will swim into a pond, and catch gnats and flies; but give it a wasp, and it immediately avoids an insect the sting of which would probably kill it. Young chickens, also, as soon as they are hatched, will take shelter under their mother's wings at the sight of a distant hawk in the air, while they show no dread at a turkey or goose, however nearly it may approach them, and although much more formidable in appearance. Amongst the wild cattle which are still found in two or three of our parks in England, the young calves show considerable ferocity as soon as they are dropped; while the calves of our domestic cows are remarkable for their gentleness, and allow

themselves to be handled without exhibiting any signs of fear or wildness. I have also observed that the kittens of a cat who prowls about our barns and outhouses, and avoids observation, are much more fierce in their nature than the young of a cat accustomed to live much in the house. The parents' ferocity or tameness seem to be imparted to the young with life. I always listen with great attention to the observations made by country people on the peculiar habits of some animals. Thus I have heard them say, that when the swans on the river Thames fly against the stream it is sure to rain, and that this will be the case when rooks are more than usually clamorous on their return to their roosting-places in an evening. The scream of a peacock, and the peevish incessant cry of a guinea-fowl, are also similar prognostications. The loud and discordant note of the woodpecker is a sign of a change of weather, and it is therefore in some places called the rain-fowl.

Should the deer in Hampton Court Park collect on a small mound there, I am assured that it portends an approaching storm.

MIGRATION OF SWALLOWS.

THE *unanimity of purpose* in swallows is one of those facts in natural history which I always reflect upon with wonder and curiosity. I allude to those vast collections of them which are seen every year, the attempts they appear to make in order to prepare themselves for their migration, and the sudden disappearance of the whole flock in one instant. They may be compared to one of those vast caravans which are known to assemble in the East, in order to make the passage of an extensive and dangerous desert, for the purpose of arriving at some far-distant place. Those have, however, a leader, and a sun, a moon and stars to guide them; while the swallow, with nothing to direct it but that unexplained instinct which a beneficent Creator has implanted in it, traverses the *deserts* of the air, passes through regions where it had never been before, and may be seen skimming the pools of Greece (its Mecca) with its wonted hilarity.

—"There
They twitter cheerful, till the vernal months
Invite them welcome back."—

The mystery of instinct is, indeed, great, and human ingenuity cannot satisfactorily explain it. Here we see thousands of swallows, old and young, assembled together at one spot on the banks of the Thames in each year, and generally about the same day.

So many myriads of birds could not have been produced in the immediate neighbourhood, and therefore we may fairly presume that they have arrived from places far remote from each other. But what leads them to assemble on a little aye on the river Thames? How do the metropolitan and the Selborne swallows, those from villages in Sussex and Berkshire, or any other places, become possessed with such an unanimity of purpose? We see a vast flock assemble in the course of one day; they remain with us two or three, and after having made several circuitous flights, they suddenly disappear. But how is the moment of their departure determined upon? Some may be weary, and others young and weak, and yet not one is left behind.

I have been assured, by a gentleman residing on the sea-coast in Lancashire, and who is a great observer of the habits of swallows, that, after they have taken their annual departure, a sudden storm has sometimes happened and they have re-appeared in his neighbourhood. There can, I think, be no doubt, that swallows re-migrate from this country in the spring, if the weather is not genial, after their first arrival. I observed this to be the case in the spring of 1834. A large flight of them arrived in the neighbourhood of Richmond, Surrey, on the 5th

of April; but there was a prevalence of cold winds at the time, and they all disappeared. I did not see them again in any numbers until the beginning of May. The cold weather had driven them back to milder regions.

The migratory nature of swallows appears to be the same in all countries of the world where they are found, and they seem to possess the same impulse to guide them. Thus a friend, who had resided at the Cape of Good Hope, where a variety of the swallow tribe, is found, informed me that they all disappeared at a certain season of the year, as they do with us. I was also told by the captain of an Indiaman, that when he was in the Bay of Bengal, far from land, his ship was covered with swallows. The following extract of a letter from an observant traveller, will show the time of their appearance and disappearance at several places in Europe.

"Swallows disappeared at Rolle, in Switzerland, about the end of September: but on the 17th of October, I saw a pair as we passed among the mountains towards Fort le Cluse, on the road to Lyons, and my servant saw a pair on the 19th, when we got through the mountains into Bresse. Passing an islet of the Rhone, October 23d, near Pont St. Esprit, I again saw a swallow, which dipped to drink. I was ashore, November the 10th, at Porto Longona, in the isle of Elba, and saw three swallows crossing the port towards us: they flew almost straight, and very swiftly, and I should have supposed were going to Italy, if the distance had been less, and the sun not so near setting. Swallows appeared at Naples early in February, and on the 8th of March, martins were busy building under the eaves of a house at that place. On the 18th of March, swallows were first seen on the Lake of Geneva, and on the 25th were numerous. I am assured that a single martin commonly arrives first, as if to explore; and again withdraws, as if to fetch a colony."

Swallows, in taking their departure from this country, have been seen in a continuous line of more than half a mile in length. The flight began at four o'clock in the evening of the 27th of September, in a southern direction. These birds, however, do not arrive in as great numbers as they leave us.

In examining the head of a live swallow, it is impossible not to observe the extraordinary appearance of sagacity in it, and which is perfectly distinct from that of any other bird. Indeed it is quite impossible to observe the quickness, animation and sense of its eye, without being impressed with the

idea, that the Almighty Creator has endowed it with properties of a very peculiar kind, and nearly allied to reason.

The confidence which these birds place in the human race is not a little extraordinary. They not only put themselves, but their offspring, in the power of man. I have seen their nests in situations where they were within the reach of one's hand, and where they might have been destroyed in an instant. I have observed them under a door-way, the eaves of a low cottage, against the wall of a tool-shed, on the knocker of a door, and the rafter of a much-frequented hay-loft.

Dr. Richardson, in his American Fauna, mentions "that on the 25th of June, 1825, a number of cliff swallows (*Hirundo lunifrons*) made their first appearance at Fort Chipewyan, and built their nests under the eaves of the dwelling-house, about six feet above a balcony that extends the whole length of the building, and is a frequented promenade. They had thus to graze the heads of the passengers on entering their nests, and were, moreover, exposed to the curiosity and depredations of the children, to whom they were novelties; yet they preferred the dwelling-house to the more lofty eaves of the storehouses, and in the following season returned with augmented numbers to the same spot." Until this year their clustered nests had been only found on the faces of the rocky cliffs.

A swallow will build its nest against a pane of glass, where it appears to stick very firmly, although it has no other support. The bird must, I think, make use of some unusually glutinous matter in order to make the nest adhere to the glass; I mean something different from what it would have used had the nest been built against a wall.

I observe that the chimney-swallow begins to twitter or sing almost on its first arrival. This leads me to think that the male birds arrive first, and the females probably some time afterwards. This is the case with many of our small migratory singing-birds, the males arrive first, and singing with great earnestness to collect the females around them.

There is scarcely a village in England in which an assemblage of some four or five hundred swallows may not be seen early in September, either on the church or some other large building. These, in their flights, meet with other assemblages, and join them, and this may account for the vast collections of these birds on the aytes of the river Thames. When seen on a building, they open their wings to admit the warmth of the sun, and preen their feathers, appearing joyous and

happy. It is a pretty sight, but it reminds us that winter is approaching.

It is extraordinary that so many persons, both in ancient and modern times, should so pertinaciously have entertained the idea that swallows either pass the winter at the bottom of some deep lake or river, or else hide themselves in cliffs and caverns :—

"Cum glaciuntur aquæ, scopulis se condit hirundo, Verberat egelidos garrula vere lacus."

The idea of swallows hiding themselves in caverns is stated as a fact by a French writer :—

"Entre la ville de Caen et la mer, le long de la rivière d'Orne, nous avons beaucoup de cavernes, où l'on a quelquefois trouvé, pendant l'hiver, des pelotons d'hirondelles à la voûte, en forme de grappes."

It is needless for me to add that both these theories are totally groundless.

In mild seasons swallows have since been seen in the neighbourhood of the Thames as late as November, and induced by the peculiar mildness of the season they have attempted to rear a late brood. When, however, the setting in of cold nights, or a want of food, has warned them to depart, instead of leaving their young to starve in the nest, they have been seen, with the assistance of other swallows, to eject them from the nest, in order that they might meet a more speedy death on the ground. Wasps are known to do the same thing when they can no longer procure food to feed the young brood.

It is still a question whether, when the swallow leaves us in the autumn, it breeds again in those mild climates to which it resorts, or whether it merely passes its time in search of food.

"WHERE THERE'S A WILL THERE'S A WAY."

BY ELIZA COOK.

WE have faith in old proverbs full surely,
For wisdom has traced what they tell,
And Truth may be drawn up as purely
From them, as it may from a "well."
Let us question the thinkers and doers,
And hear what they honestly say,
And you'll find they believe like bold woo-
ers,
In "Where there's a will there's a way."

The hills have been high for man's mount-
ing,*
The woods have been dense for his axe,
The stars have been thick for his counting,
The sands have been wide for his tracks,
The sea has been deep for his driving,
The poles have been broad for his sway,
But bravely he's proved in his striving,
That "Where there's a will there's a way."

Have ye vices that ask a destroyer?
Or passions that need your control?
Let Reason become your employer,
And your body be ruled by your soul.

Fight on, though ye bleed at the trial,
Resist with all strength that ye may,
Ye may conquer Sin's host by denial,
For "Where there's a will there's a way."

Have ye poverty's pinching to cope with?
Does suffering weigh down your might?
Only call up a spirit to hope with,
And dawn may come out of the night.
Oh! much may be done by defying
The ghosts of Despair and Dismay,
And much may be gained by relying,
On "Where there's a will there's a way."

Should ye see afar off that worth winning,
Set out on a journey with trust;
And ne'er heed though your path at begin-
ning
Should be among brambles and dust.
Though it is but by footsteps ye do it,
And hardships may hinder and stay,
Keep a heart, and be sure you'll get through
it,
For "Where there's a will there's a way."

I HAD A RARE AND TENDER PLANT.

BY EMILY VARDELL.

I HAD a rare and tender plant
That in my garden grew;
I thought I watch'd its every want,
But ah! it never blew!
'Twas not for lack of care it pined,
With tend'rest love carest;
For long I know it well divined
Of all—I loved it best.

I saw it fading day by day,
A snow-wreath in the sun,
For so it seem'd to go away,
My own beloved one!
My garden is all lone and bare
A wild blast swept it o'er:
The flower that should have blossom'd there
Is now, alas! no more!

INSTINCT OF ANIMALS.

THE movements, or motions, of some birds are very peculiar—those of the wag-tail, redstart, and starling, for instance. The cock-robin has a very “gallant bearing,” and shows much courage. The hedge-sparrow is very timid and peaceable. The wren is *fidgetty* and constantly on the move. The goldfinch always appears to be in a state of restlessness. The blackbird and song-thrush show much attachment to their mates. The latter sometimes takes a rapid run on my lawn, and then stops and seems to consider what she should do next, holding her head a little on one side. The sparrow has a bold familiarity which destroys the interest we might otherwise feel for him. I have observed that the young ones which have been reared amidst the smoke of London, will hop about the streets before they can well fly, collecting crumbs of bread, or other food, and appearing to have imbibed so early that boldness, and carelessness of danger, which is so conspicuous to any one who has watched the character of these Londoners. I am always amused in looking at the apparent recklessness of this bird, and then seeing how it secures itself from harm at the precise moment in which it is necessary to do so. Few things indeed can show more forcibly the powerful instinct which is implanted in animals for their self-preservation, than the means which they take to avoid danger.* I saw an instance of this lately in a stag. It had been turned out before a pack of hounds, and when somewhat pressed by them, I observed it twice to go amongst a flock of sheep, and in both cases to double back, evidently, I should imagine, with the intention of baffling the pursuit of the dogs. It would thus seem that the animal was aware of its being followed by the scent, and not by sight. If this be the case, it affords another proof that animals are possessed of something more than common instinct.

In riding over the Brighton Downs, I dis-

turbed one of the horned owls. The sun was shining brightly, which probably caused the bird to alight again at a short distance from me. On going up to it, it cowered or rather squatted, like a hare in its seat, but always turned its eye towards me whichever way I moved. I disturbed it several times, and remarked that the bird not only made itself as flat as possible, but alighted on those places which assimilated most to its own colour. Both salmon and trout, when they are hooked, will frequently throw themselves out of the water and endeavour, by falling upon the line with their whole weight, to break it. I have also been assured that when rats have been caught by the foot or leg in a trap, they will sometimes, in order to disengage themselves, gnaw off the limb. A gentleman who resides near Southampton had a retriever, a large half-bred Newfoundland dog, who had formed a friendship with a horse, which, at the time I am referring to, was turned out into a paddock near the house. The dog, hunting one day by himself, was caught in a snare by the leg, and after struggling some time, during which its cries were heard, he disengaged himself so far from his confinement as to break the string of the snare, the wire being still attached to the limb. In this situation he was observed, by my friend and his host, to go to the horse in the paddock, and seemed at once to make him aware of his distress. The horse gently put his nose down to the dog, and the dog having licked it, lifted up the leg to which the snare was attached in a manner which could not be mistaken. The horse immediately began to try to disengage the snare by applying his teeth to it in a gentle and cautious manner, although he was unable to succeed in removing it. This is by no means a solitary instance of the sympathy which animals show for each other when in distress.

DISTANCE OF THE STARS.

LIGHT is the swiftest moving body with which we are acquainted; it flies from the sun to the earth, a distance of ninety-five millions of miles, in about eight minutes, or at the rate of 192,000 miles every moment of time; yet light, incomprehensibly swift as its motion is, would require ten years and

114 days to fly across this mighty interval; so that if the star 61 *Cygni* were supposed to be only just now launched into existence, it would be more than ten years before its light could reach the distant globe on which we dwell, so as to appear like a small star twinkling in our sky. Suppose a cannon ball to move 500 miles every hour without intermission, it would require fourteen millions, two hundred and fifty-five thousand, four hundred and eighteen years before it could move across the same interval.

* I have heard it stated, but I know not how truly, that when the corn is ripe, all the London sparrows migrate into the country. Large flocks of them are certainly seen in the neighbourhood of the metropolis in the Autumn.

INHABITANTS OF OTHER WORLDS.

THE inhabitants of the planets are not *purely spiritual* beings; for pure spirits, entirely divested of material vehicles, cannot be supposed to have a permanent connection with any material world or system; nor could they be supposed to be affected by air, light, colours, attraction, or other material influences, which operate on the surfaces of all the planetary bodies. If pure intelligences, disconnected with matter, exist in the universe, they must be conceived to have a more expansive range than the limits of any one globe, and those material agencies which affect the organs of sensitive existence cannot be supposed to operate upon them; and, consequently, their modes of perception must be altogether different from those of organized intelligences. We may therefore with certainty conclude that the intelligent beings connected with the planetary worlds, either of our own or of other systems, are furnished with *bodies*, or corporeal vehicles of some kind or other. These may differ in size and form in different planets; perhaps their size may depend on the amplitude of space which the different planets may contain.

But I cannot acquiesce in a supposition lately thrown out by a certain reviewer, that "in some worlds the inhabitants may be as large as mountains, and in others as small as emmets." In the one case, comparatively few inhabitants could live in a world where every one was a walking Mount Blanc or Mount Etna; and it would be contrary to all the known arrangements of the Creator, who appears to act on the principle of compressing into a small space the greatest degree of sensitive and intellectual enjoyment. Besides, such a huge mass of matter as a mountain is not only unnecessary, but in all probability would be highly injurious to the exercise of the intellectual faculties. In the other case, were rational beings as small as emmets, they could neither contemplate the beauties and sublimities of the scene of nature around them, nor the glories of the starry firmament; their range of vision could extend only a few feet or yards around them, and they never could be able to explore the nature, extent, and peculiarities of scenery of the world they inhabited. So that all such suppositions are evidently extravagant and absurd, being directly contrary to the proportion and harmony which exist in the universe, and which characterize all the arrangements of the Creator.

In regard to the powers of locomotion,

there may be considerable differences in different worlds. In many instances there is reason to believe their inhabitants are enabled to transport themselves from one region to another with a velocity far surpassing the locomotive powers of man. In the planet Venus some of the mountains are reckoned to be twenty-two miles in perpendicular elevation, from the top of which eminences the most sublime and diversified prospects must be enjoyed; and in order that its inhabitants may be enabled to ascend with ease such lofty elevations, it is not unreasonable to believe that they are endowed with powers of motion far superior to those of the inhabitants of our globe.

The inhabitants of the planets are furnished with organs of sensation, particularly with the *organ of vision*. This may be certainly deduced from the fact, that there are connected with the planets arrangements for the equable *distribution of light*. The sun, the source of illumination, is placed in the centre of the system, for diffusing light in certain proportions over the surfaces of all the planets, their satellites, and their rings. Each planetary body revolves round its axis, in order that every part of its surface may alternately enjoy the benefit of the solar radiation. Around the larger planets are moons for the distribution of light in the absence of the sun; and one of them is invested with a splendid double ring, which reflects the solar rays during night both on the surface of the planet itself and on the surfaces of its moons. This diversified apparatus for the diffusion of light evidently appears to be an arrangement of *means* in order to the accomplishment of an important *end*; for it would be a reflection on the character of the All-wise Contriver to suppose that means have been arranged where no appropriate end is intended to be accomplished; but all the arrangements for the regular and equable diffusion of light have been made in vain, if there be no *eyes* or organs of vision on which light may act; for mountains, and vales, and barren deserts do not require its regular influence.

That there are beings furnished with visual organs throughout all the worlds and systems of matter in the universe appears from the consideration, that not only in our own system, but among the myriads of fixed stars dispersed throughout immensity, provision is made for such organs in the existence of *light*, which is a substance that appears to be *universally diffused* throughout creation.—*Dick*.

HOW LONG BEES LIVE.

THE natural length of a queen's life has never been ascertained, but some have been known to live four or five years. The drone, "the lazy yawning drone," only lives as many months. Hatched in April, they are generally cast out of the hive by the other bees, to starve, about June or July; I have even known the workers drag the half-formed drones from their cells, and carry them out to perish. The ancient Greeks had an ingenious method of excluding drones from the hives. "It was observed that these gentlemen, (the drones,) though in no way inclined to work, would yet occasionally, on very fine days, go abroad for exercise, rushing forth in squadrons, mounting aloft into the air, and there wheeling and sporting and manœuvring in the sun. Taking advantage of their absence, they spread a fine net over the hive-entrance, the meshes of which, large enough to admit the bee would exclude the drone." This would not be a bad plan for the English bee-master to adopt; but he should wait till the bees themselves have begun to drive out the drones; for surely they alone can judge of the proper time for this harsh measure.* The drone doubtless serves an important purpose, although we must acquiesce in the amusing description of old Butler, who says, "He is a gross stingless bee, that spendeth his time in gluttony and idleness. For how-

ever he brave it with his round velvet cap, his side gown, his full paunch, and his loud voice, yet he is but an idle companion, living by the sweat of others' brows. He worketh not at all, either at home or abroad, and yet spendeth as much as two labourers; you shall never find his maw without a good drop of the purest nectar. In the heat of the day he flieth abroad, aloft, and about, and that with no small noise, as though he would do some great act; but it is only for pleasure and to get him a stomach; and then returns he presently to his cheer." The life of the common bee is busy and short. Those which are hatched in the spring of one year die before the close of the next, generally about August or September. They die, weakened by old age, worn out with toil, or suddenly destroyed by one of a thousand accidents; snapped up by a tomtit, interrupted in mid-flight by a swallow, dashed headlong into a pond by the boisterous wind, trampled on by a child, crushed by the foot of a cow while sucking honey from white clover or wild thyme, overpowered by a hornet, wounded in mortal combat by a wasp, caught in a treacherous spider's web, swallowed by a cold and bloated toad while resting on the ground, burnt or neglected by their owners, or killed in fierce battle with the robbers from a neighbouring hive.—*An Essex Man.*

THE HOUSE LOVE-HAUNTED.

BY THOMAS MACKELLAR.

GIVE me a house that's haunted,
With Love the only sprite;
I'll dwell in it undaunted,
Nor fear it's utmost spite.

Though witching tones are swelling
Above me and beside,
Where Love is in the dwelling
I am content to bide.

If every beam and rafter
And every stone and tile
Re-echo with its laughter,
My heart shall laugh the while.

The favoured room or chamber
Frequented by the ghost,
I'll oftenest remember,
And I will prize it most.

When morn is stilly breaking
And earth is growing light,
I'll tremble not if, waking,
Mine eyes behold the sprite.

If, as the day grows older,
The heavenly-temper'd thing
Taps tenderly my shoulder,
Rejoicingly I'll sing.

When in the midnight lonely
Day's brighter scenes are hid,
I'll sweetly sleep if only
Love stirs the coverlid.

I'd ever be enchanted
By Love's bewitching spell,
And in a house love-haunted
I would my life-long dwell.

And when my time is ending,
And heaven is coming nigh,
Let Love, my soul attending,
Go with me to the sky.

* Well would it be if drones in the human hive, of which there are too many lounging about, could be served in the same way.—*El. P. L. & A.*